ESSO EXPLORATION AND PRODUCTION
AUSTRALIA INC.

WELL COMPLETION REPORT
ANGELFISH-1
INTERPRETATIVE DATA
VOLUME 2

GIPPSLAND BASIN
VICTORIA

ESSO AUSTRALIA LIMITED

Compiled by: M.FITTALL

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ANGELFISH 1

WELL COMPLETION REPORT

VOLUME 2

(Interpretative Data)

CONTENTS

FIGURES

APPENDICES

ENCLOSURES

Doc. 2583L/1

GEOLOGICAL AND GEOPHYSICAL ANALYSIS

PROGNOSIS (KB = 21m ASL)

Formation/Horizon	Pre-Drill Depth (mSS)	Post-Drill Depth (mSS)
SEASPRAY GROUP	70	-70
LATROBE GROUP	1592	-1627
Base of Tuna-Flounder Channel	1930	-1984
Mid Paleocene Seismic Marker	2470	-2440
T. lilliei Seismic Marker	2950	-2920
TOTAL DEPTH	3300	-3400

INTRODUCTION

The Angelfish discovery is an intra-Latrobe Group fault-dependent structure situated between the Tuna Field and the Flounder Field. The structure is located on the downthrown side of one of a series of NW-SE trending faults.

Angelfish-1 tested the proposed play concept of a fault-seal dependent trapping mechanism. Hydrocarbons were discovered in the secondary target of the well, which was the deep intra-Latrobe Group section. However, the primary target beneath the Mid Paleocene Marker, and the shallower tertiary target, did not contain hydrocarbons.

GEOLOGICAL AND GEOPHYSICAL DISCUSSION

Stratigraphy (Enclosure 1, Figure 1)

Angelfish-1 penetrated 1557.0 metres of limestone and calcareous sediments of the Seaspray Group (Lakes Entrance Formation and Gippsland Limestone). These sediments are Early Miocene (H1 foraminiferal zone) to Recent in age.

The Seaspray Group is unconformably underlain by 357 metres of Flounder Formation sediments of Early Eocene age (Upper *M. diversus* to *P. asperopolus* palynological zones). The upper section consists of silty shale with occasional thin dolomitic sands, which becomes glauconitic and pyritic at the top. This sequence is interpreted to have been deposited in an offshore to lower shoreface environment. The basal section consists of interbedded sands (commonly dolomite cemented), silts and occasional shales. This section is interpreted to represent several channelling sequences which have been deposited in a fluvial/estuarine environment. The Flounder Formation represents lowstand and transgressive deposits infilling the Tuna-Flounder Channel complex, which was formed as a result of a major drop in eustatic sea-level.

The Flounder Formation is unconformably underlain by the Latrobe Group "coarse clastics" sequence, which is Late Cretaceous to Late Paleocene in age. The Paleocene section (Lower to Upper *L. balmei* palynological zones) consists of interbedded sands, silts, shales and coals, which becomes shalier and more coaly towards the base at Mid Paleocene Marker level. This sequence is interpreted to have been deposited in a floodplain (with occasional point bars) to coastal plain environment.

The Mid Paleocene Marker is underlain by two broadly coarsening-up sequences, consisting of silty shale overlain by clean sand. These sequences are latest Cretaceous to Early Paleocene in age (Upper *T. longus* to Lower *L. balmei* palynological zones), with the Cretaceous-Tertiary boundary present in the upper shale. This marine transgression is recorded throughout much of the Gippsland Basin. The shales are interpreted to be transgressive sediments deposited in an offshore to lower shoreface environment, while the sands are interpreted to be regressive sediments deposited in an upper shoreface to estuarine environment.

The remaining Latrobe Group section consists of interbedded sands, silts, shales and thin coals of Late Cretaceous age (T. lilliei to Upper T. longus palynological zones). This dominantly shaley sequence is interpreted to have deposited in a floodplain to coastal plain environment.

A comparison of the Angelfish-1 stratigraphy with the nearby Batfish-1 well and with seismic data to the SW, shows significant amounts of growth have occurred on the downside of the NW-SE trending faults. This syndepositional growth has taken place during L. balmei and T. longus time.

Structure and Seal (Enclosures 2 & 3; Prognosis)

The Angelfish structure is mapped as fault-dependent closure throughout the intra-Latrobe Group sequence, and is located on the downside of the Angelfish fault. Post-drill interpretation indicates the structure is essentially unchanged in configuration at Mid Paleocene Marker level and T. lilliei seismic marker level from the pre-drill mapping. Throw on the Angelfish fault increases with depth as indicated pre-drill.

The top of the Latrobe Group was penetrated 35 metres low to prediction. This is thought to be due to a higher interval velocity encountered in the late Tertiary section than was predicted. The base of the Tuna-Flounder Channel was penetrated 54 metres low to prediction. The pre-drill seismic marker is now interpreted to correlate to a channelling event within the basal section of the Tuna-Flounder Channel complex. The Mid Paleocene Marker was penetrated 30 metres high to prediction, which is thought to be due to an inaccurate velocity prediction. The post-drill T. lilliei seismic marker has been tentatively placed at the base of a coaly section, which is 30 metres high to prediction. It is difficult to evaluate this seismic marker because it does not correlate to a specific stratigraphic horizon. Also, age dating of Angelfish-1 and revision of the Batfish-1 dating shows the event is mapped near the top of the Lower T. longus section, but has been designated the T. lilliei seismic marker to be consistent with the pre-drill prognosis.

The hydrocarbons discovered by Angelfish-1 within the overpressured Lower T. longus section are top-sealed by intra-formation shales. The hydrocarbons may be fault-sealed against the Angelfish fault with significant columns being present. Alternatively, they may be stratigraphically trapped within the intra-formation seals.

Reservoir and Hydrocarbons (Appendices 3 to 5)

Angelfish-1 discovered a total of 52.0 metres net hydrocarbon-bearing sands over the interval 3048.3mKB to 3289.5mKB (241.2m gross). 6.8m net of these hydrocarbons is interpreted to be oil productive, and 24.3m net is interpreted to be gas-productive. The remainder is interpreted to be low-saturation oil.

Low-saturation oil sands are present over the intervals 3048.3mKB to 3112.8mKB, 3193.0mKB to 3198.5mKB, and 3283.5mKB to 3289.5mKB. Reservoir quality of these sands is generally poor with average porosities of 11% to 17% while water saturations range from 63% to 87%. Filtrate with small amounts of gas and a trace of waxy oil were recovered by RFT at 3194.3mKB and 3285.0mKB.

Gas sands are present over the intervals 3142.0mKB to 3162.8mKB, and 3216.0mKB to 3282.8mKB. The reservoir quality of these sands is generally poor, with average porosities of 11% to 15%, while gas saturations range from 35% to 60%. Core plugs taken from Core-1, which was cut partly in the highest gas sand, measure an average permeability of 10md (range of 0.3md to 66md), and a corresponding average porosity of 13%. These results confirm the poor reservoir quality of sands at these depths. Wet gas and 1.1 litres of 50.5^{o} API condensate was recovered by RFT at 3143.0mKB.

An oil sand was discovered from 3122.0mKB to 3130.0mKB. The reservoir quality of this sand is poor to moderate, with an average porosity of 14% and an average oil saturation of 43%. An RFT sample taken at 3127.0mKB recovered 2.0 litres of 49.0^{o} API waxy oil with a GOR of approximately 4400 SCF/BBL. RFT pressure data does not indicate a possible column height but the sand could be filled to the structural spill-point as mapped at the _T. lilliei_ marker. However, this zone is not considered to be a commercial accumulation due to the assumed poor continuity of the reservoir, the high GOR of the oil, and the moderately high water saturation. The recovery factor for this zone would be very low.

The primary target, the sand below the Mid Paleocene Marker, has very good reservoir quality with an average porosity of 21%. The sands of the tertiary target, the _L. balmei_ section, also have very good reservoir quality with average porosities up to 23%.

The hydrocarbons discovered by Angelfish-1 are associated with mild overpressure. Formation pressure rises progressively from the normal 8.5ppg MWE at 3003.0mKB to 9.3 ppg MWE at 3285.0mKB. The RFT pressure data shows the transition to overpressure begins at approximately 3010mKB, while the top of hydrocarbons is at 3048.3mKB. The overpressuring infers there is very little communication between sands.

The high water saturations of the low-saturation oil sands are thought to be due to limited charging of the sands with hydrocarbons as a result of simultaneous dewatering and hydrocarbon generation from the surrounding shales. The high water saturations could not be due to leakage of hydrocarbons from the sands at the fault-plane because this would have resulted in normal formation pressures.

Geochemical analysis of cuttings samples and sidewall core samples indicate fair to good source potential was encountered in Angelfish-1 within parts of the Paleocene and Late Cretaceous sections of the Latrobe Group. Shales and siltstones in these intervals commonly encountered TOC's greater than 1.5%. The organic matter type of these sediments indicate they are capable of generating mainly terrestrially-sourced gas, and possibly terrestrially-sourced condensate and/or oil from the Late Cretaceous section.

Maturation data indicates the Angelfish-1 section is presently mature for liquid hydrocarbon generation at approximately 3000mKB. The top of maturation coincides with the top of hydrocarbons and top of overpressure. This strongly suggests that the hydrocarbons discovered by Angelfish-1 have been generated in situ and are fault-sealed or stratigraphically isolated accumulations which have been unable to migrate away from the Angelfish-1 location. The lack of hydrocarbons above 3048.3mKB, and particularly in the primary target, is therefore attributed to a lack of a suitable migration pathway into the higher reservoir sands. Alternatively, it is possible hydrocarbons have migrated up faults and updip in the Angelfish area, but have not accumulated in the shallower reservoirs due to the fault-leakage. However, this explanation requires that each and every sand above 3048.3mKB in Angelfish-1 is subject to fault-leakage, whereas it might be expected that an occasional stratigraphically isolated sand would have trapped any hydrocarbons migrating through the Angelfish location.

FIGURES

ANGELFISH-1
STRATIGRAPHIC TABLE

AGE (M.A.)	EPOCH	SERIES	FORMATION HORIZON	PALYNOLOGICAL ZONATION SPORE-POLLEN	PLANKTONIC FORAMINIFERAL ZONATION	DRILL DEPTH (metres)	SUBSEA DEPTH (metres)	THICKNESS (metres)
	SEA FLOOR							
	PLEIST.		SEASPRAY GROUP		A1/A2	91.0	70.0	
	PLIO.				A3			
5	MIOCENE	LATE			A4			
					B1			
10				*T.bellus*	B2			1557.0
					C			
15		MID			D1/D2			
					E/F			
20		EARLY			G			
				P.tuberculatus	H1	1648.0	1627.0	
					H2			
25	OLIGOCENE	LATE			"I"			
30		EARLY			J1			
					J2			
35				*Upper N.asperus*	K			
	EOCENE	LATE		*Mid N.asperus*				
40–50		MIDDLE		*Lower N.asperus*				
		EARLY	LATROBE GROUP: FLOUNDER FM	*P.asperopolus*		2005.0	1984.0	357.0
55				*Upper M.diversus*				
				Mid M.diversus				
				Lower M.diversus				
60	PALEOCENE	LATE	LATROBE GROUP: "COARSE CLASTICS"	*Upper L.balmei*				
65		EARLY		*Lower L.balmei*				1416.0+
	LATE CRET.			*T.longus*				
70				*T.lilliei*		3421.0	3400.0	

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APPENDIX
1

APPENDIX 1

APPENDIX 1

MICROPALEONTOLOGICAL ANALYSIS

FORAMINIFERAL ANALYSIS, ANGELFISH-1
GIPPSLAND BASIN

by

M.J. HANNAH

ESSO AUSTRALIA LTD.
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INTRODUCTION

The worked residues of four samples from near the top of the Latrobe Group in Angelfish-1 have been examined and their foraminiferal assemblages noted. The oldest sediments dated by foraminifera are from the base of the marine carbonates of the Seaspray Group. These are assigned to Zone H-1, Early Miocene.

TOP OF THE LATROBE GROUP

The top of the Latrobe group occurs between sidewall cores 58 (at 1649.0m) and 59 (at 1644.0m). The boundary is marked by a change, upsection, from a sand to a carbonate.

BIOSTRATIGRAPHY

Zone H-1 Early Miocene
1644.0m

The presence of Globigenina woodi connecta without Globigerinoides trilobus indicates a Zone H-1 age for this sample. Other species present include Globorotalia mayeri, Globorotalia miozea, and Globigeria woodi woodi.

The assemblage is moderately diverse and preservation is fair.

Zone G Early-Middle Miocene
1638.5m.

The addition of Globogerinoides trilobus to a similar assemblage to that found in Zone H-1 indicates a Zone G (Early-Middle Miocene) determination.

Also present in this sample was Globrotalia postcretacea and Globigerina angiporoides indicating a significant amount of reworking.

PLANKTONIC MICROFOSSIL

DEPTH	SWC NO.	YIELD	PRESERVATION	ZONE	AGE	LITHOLOGY*
1665.5	57	Barren	-	-	-	Medium-fine quartz sand. Micaceous, few large benthonic foraminifera
1649.0	58	Barren	-	-	-	Fine quartz sand.
1644.0	59	High	Fair	H-1	Early Miocene	Recrystalized carbonate, dominated by foram tests rare glauconite grains.
1638.5	60	High	Fair	G	Early-Middle Miocene	Dominantly foram tests Common glauconite grains

* from washed residues.

DATA SUMMARY - ANGELFISH-1

APPENDIX
2

APPENDIX 2

APPENDIX 2

PALYNOLOGICAL ANALYSIS

PALYNOLOGICAL ANALYSIS OF ANGELFISH-1

GIPPSLAND BASIN, SOUTHEASTERN AUSTRALIA

by

Neil G. Marshall

Esso Australia Ltd.

Palaeontology Report 1986/10 June, 1986

2208L

CONTENTS

INTRODUCTION

Fifty-six sidewall core samples were examined for palynomorphs from Angelfish-1. Occurrences of spore-pollen and dinoflagellate species in each sample are recorded on the enclosed range chart. Tables 1 and 3 summarize interpretative and basic palynological data, and anomalous occurrences of spores-pollen and dinoflagellates are listed in Table 2.

SUMMARY TABLE

AGE	FORMATION	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE
Early Miocene	Lakes Entrance Formation	P. tuberculatus 1638.5-1644.0m	-
	1648.0m		
Early Eocene	Flounder Formation	P. asperopolus 1649.0m	-
		Upper M. diversus to P. asperopolus 1665.5-1906.3m	-
		Upper M. diversus 1965.0-1988.7m	R. waipawaense 1965.0m
	2005.0m		
Late Paleocene	Latrobe Group (coarse clastics)	Upper L. balmei 2014.0-2033.3m	A. homomorphum 2033.3-2188.0m
Paleocene		Lower L. balmei 2050.5-2505.0m	E. crassitabulata 2259.0m
Early Paleocene			T. evittii 2496.5-2505.0m
Maastrichtian		Upper T. longus 2536.0-2880.4m	M. druggii 2536.0m
Maastrichtian		Lower T. longus 3038.4-3246.7m	-
Campanian		T. lilliei 3324.0-3403.0m	-
	T.D. 3421.0m		

GEOLOGICAL COMMENTS

1. Palynological analyses of the section of Latrobe Group (1648.0-3421.0m) penetrated in Angelfish-1 indicates that it ranges from the Late Cretaceous to Early Eocene (T. lilliei - P. asperopolus Zones). As predicted in the geological interpretations, the Flounder Formation in the well is of Early Eocene age (Upper M. diversus - P. asperopolus Zones), and the underlying coarse clastics of the Latrobe Group ranges in age from Campanian to Paleocene (T. lilliei - Upper L. balmei Zones).

2. As part of correlations of the palynological assemblages from Angelfish-1 with those in nearby wells, the material in the Late Cretaceous sections of Batfish-1 and Kahawai-1 have been reexamined and assessed in terms of present zonal concepts. As a result of this, the distribution of the Late Cretaceous zones in these wells have been altered slightly and revised summary data sheets are included in this report. Reasonably good correlations now exist between the spore and pollen zones identified in Angelfish-1 and surrounding wells such as Morwong-1, Tuna-4, Batfish-1 and Kahawai-1.

3) The top of the M. druggii/base of the T. evittii dinoflagellate Zones provides a good datum for correlations when integrated with electric log character. This corresponds to a transgressive marine shale at the Cretaceous-Tertiary boundary.

4) The E. crassitabulata dinoflagellate Zone has only a sporadic distribution in wells surrounding Angelfish-1 viz: Morwong-1 (7390-7704 ft), Batfish-1 (6309 ft), and Tuna-A5 (1802.0, 1932.5m). Hence, it cannot be used as a reliable datum for correlation.

5) Four "Wetzeliella" dinoflagellate Zones are recognized in the channel-fill sequence represented by the Flounder Formation over the Flounder Field. Only the oldest of these zones is identified in Angelfish-1. It is the Rhombodinium waipawaense Zone, which occurs at the same level as the Upper M. diversus spore-pollen Zone.

The Kisselovia thompsonae dinoflagellate Zone (second youngest "Wetzeliella" Zone) occurs in the channel sequence in Tuna-1 (4515.0-4621.0 ft), Tuna-A5 (1333.0-1487.0m), and Tuna-3 (4586 ft), but has not been recorded further west in Tuna-2, Tuna-4, Kahawai-1, Batfish-1, or Angelfish-1.

2208L:4

6) The patchy distribution of the zonal species Proteacidites asperopolus in the Flounder Formation of the Flounder Field makes it difficult to pick the boundary between the Upper M. diversus and P. asperopolus Zones on spore-pollen evidence alone. This problem is also thought to exist in the Flounder Formation penetrated in Angelfish-1. In the area of the Flounder Field, the "Wetzeliella" dinoflagellate Zones provide an independent means of dating the assemblages, with the Rhombodinium ornatum and R. waipawaense dinoflagellate Zones being associated with the Upper M. diversus Zone and the Kisselovia thompsonae and K. edwardsii dinoflagellate Zones corresponding to the P. asperopolus Zone.

In Angelfish-1, however, no dinoflagellate zones younger than the R. waipawaense Zone were observed. Above the level of this zone to near the top of the Flounder Formation (1665.5-1906.3m), samples contain an indistinct spore-pollen assemblage that can be only assigned to a generalized Upper M. diversus - P. asperopolus Zone. One sample studied from near the top of the Flounder Formation (1649.0m) contained rare specimens of P. asperopolus and could therefore be placed in the P. asperopolus Zone.

7) M. Hannah (pers. comm., March, 1986) has examined foraminiferal assemblages from two samples (1638.5, 1644.0m) near the base of the Lakes Entrance Formation in Angelfish-1, and these are dated as Early Miocene.

2208L:5

BIOSTRATIGRAPHY

The spore-pollen zones have been identified using the criteria proposed by Stover & Partridge (1973). The dinoflagellate zones are modifications on the scheme of Partridge (1976). Discussions of the dinoflagellate assemblages and their zonal assignments are given with the descriptions of their associated spore-pollen assemblages.

LATROBE GROUP COARSE CLASTICS: 2005.0-3421.0m

Tricolporites lilliei Zone: 3324.0-3403.0m

The four samples from the zone contain low yield, poorly preserved spore-pollen assemblages. The zonal species, Tricolporites lilliei, was only recorded in two samples (3403.0; 3324.0 m). Other significant species recorded within the interval are Dacrycarpites australiensis, Proteacidites otwayensis, Nothofagidites kaitangata, Tricolpites gillii, T. labrum ms., Gambierina rudata, and Aequitriradites spinulosus.

Palaeocystodinium sp. was the only dinoflagellate recorded and it occurred in the basal sample of the zone.

Lower Tricolpites longus Zone: 3038.4-3246.7m

The base of the zone was picked at the first occurrence of Tricolpites longus at 3246.7 m. Other important elements of the zone are Grapnelispora evansii, Proteacidites palisadus, P. otwayensis, P. gemmatus, Tricolpites waiparaensis, Nothofagidites kaitangata, Stereisporites regium, Camarozonosporites horrendus, and Quadraplanus brossus.

Upper Tricolpites longus Zone: 2526.0-2880.4m

The first occurrence of Stereisporites punctatus defines the base of the zone. Many distinctive taxa from the Lower T. longus Zone range into this subdivision, including Tricolpites longus, Proteacidites otwayensis, P. gemmatus, P. palisadus, Quadraplanus brossus, Grapnelispora evansii, and Camarozonosporites horrendus. Some other stratigraphically significant taxa within the zone are Lygistepollenites balmei, Proteacidites reticuloconcavus, P. wahooensis, Triporopollenites sectilis and Tetracolporites verrucosus.

Low yield dinoflagellate assemblages occur frequently, and these contain the following species: Apectodinium homomorphum, Palaeocystodinium sp., Areoligera sp., A. senonensis, Cribroperidinium sp., Manumiella druggii, Spiniferites sp., Trichodinium hirsutum, Eisenackia sp., and Paralecaniella sp. The most stratigraphically significant of these taxa is M. druggii and its occurrence is used to define the M. druggii Zone (2536.0m).

Lower Lygistepollenites balmei Zone: 2020.5-2505.0m

This zone is characterised by the absence of Tricolpites longus and the consistent and often frequent occurrence of L. balmei. Important taxa ranging into the zone from the underlying Upper T. longus Zone are Tetracolporites verrucosus, Stereisporites punctatus, S. regium, and Nothofagidites kaitangata. Some significant taxa restricted to the zone are Integricorpus antipodus, Juxtacolpus pieratus, and Polycolpites langstonii.

The sample at 2259.0m contained low records of Proteacidites annularis and P. incurvatus which appear anomalously early. These species are normally restricted to the Upper L. balmei Zone. The spore and pollen assemblage from this sample was unusually well-preserved for a Lower L. balmei Zone sample and of moderate diversity. A possible explanation of these early records is that these rare taxa are just not normally seen in the poorer quality material usually encountered in the Lower L. balmei Zone.

Three dinoflagellate zones were identified between 2050.5-2505.0m.

1. Trithyrodinium evittii Zone (2496.5-2505.0m): The zone is identified by the presence of T. evittii. The occurrence of Hystrichosphaeridium tubiferum and Deflandrea sp. at this level is consistent with the zone.

2. Eisenackia crassitabulata Zone (2259.0m): The rare occurrence of Alisocysta rugolirata is used to recognise the zone. Some other dinoflagellates recorded at this level are: Senegalinium dilwynense, Palaeocystodinium sp. P. australinium, Hystrichosphaeridium tubiferum, Glaphyrocysta retiintexta, Isabelidinium bakeri, and Apectodinium homomorphum.

3. Apectodinium homomorphum Zone (2033.3- 2188.0m): The zonal species was only recorded in the highest and lowest sample within this interval.

Upper Lygistepollenites balmei Zone: 2014.0-2033.3m

The base of the zone is marked by the occurrence of Proteacidites incurvatus at 2033.3 m. Other significant taxa recorded are Haloragacidites harrisii, Polycolpites langstonii, and frequent to common L. balmei.

Dinoflagellates recorded are Apectodinium homomorphum, and taxa of the Palaeoperidinium bassensis complex.

FLOUNDER FORMATION: 1648.0-2005.0m

The boundaries of the Upper M. diversus and P. asperopolus Zones within the section of Flounder Formation are difficult to identify reliably because of the sporadic occurrences of key species. This problem is also evident in equivalent sections of the Flounder Formation from the Flounder Field. Where dinoflagellate zones can be recognized, they provide an independent means of dating the sequence.

Upper Malvacipollis diversus Zone: 1965.0-1988.0m

Stratigraphically significant spore-pollen taxa recorded from this interval are Cupanieidites orthoteichus, Intratriporopollenites notabilis, Proteacidites grandis, P. leightonii, P. ornatus, P. pachypolus, P. tuberculiformis, and Tricolpites incisus.

The Rhombodinium waipawaense dinoflagellate Zone was identified at 1965.0m, based on the presence of the nominate species. This dinoflagellate zone is restricted to the Upper M. diversus spore pollen Zone. Some other dinoflagellates recorded from the interval are Homotryblium tasmaniense, Wetzeliella longispinosa and Glaphyrocysta velivolus ms.

Upper Malvacipollis diversus - Proteacidites asperopolus Zone: 1665.5-1906.3m

Important species ranging into this interval from the Upper M. diversus Zone are: Proteacidites leightonii, P. ornatus, P. pachypolus, P. tuberculiformis and Intratriporopollenites notabilis. Some other taxa recorded from the section are: Myrtaceidites tenuis, Anacolosidites acutullus, Triporopollenites ambiguus, T. spinosus, Beaupreaidites verrucosus, Kuylisporites waterbolkii, and Dryptopollenites semilunatus.

Dinoflagellates recorded include: Homotryblium tasmaniense, Wetzeliella longispinosa, Apectodinium homomorphum, Deflandrea flounderensis and D. truncata.

The Upper M. diversus - P. asperopolus Zones cannot be separated on the basis of the above palynological assemblage.

Proteacidites asperopolus Zone: 1649.0m

The zone is identified by the rare occurrence of the zonal species. Some other taxa recorded are: Proteacidites pachypolus, P. differentipolus, P. kopiensis, and P. tuberculiformis.

Proteacidites tuberculatus Zone: 1638.0-1644.5m

Two samples, containing low yield spore-pollen and dinoflagellate assemblages, were assigned to the zone. These are:

1) 1644.0m. This contained an indistinct spore and pollen assemblage. Diagnostic dinoflagellates recorded are: Nematosphaeropsis balcombiana and Pyxidinopsis pontus ms.

2) 1638.5m: The diagnostic spore Cyatheacidites annulatus was recorded at this level. Some dinoflagellates identified are: Nematosphaeropsis balcombiana, Pyxidinopsis pontus, P. simplex, and Tuberculodinium vancompoae

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PALYNOLOGY DATA SHEET

BASIN: GIPPSLAND BASIN   ELEVATION: KB: 21.0m GL: -70.1 m

WELL NAME: ANGELFISH-1   TOTAL DEPTH: 3413.5 m

AGE	PALYNOLOGICAL ZONES	HIGHEST DATA					LOWEST DATA				
		Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	*T. pleistocenicus*										
	M. lipsis										
	C. bifurcatus										
	T. bellus										
PALEOGENE	*P. tuberculatus*	1638.5	0				1644.0	2			
	Upper *N. asperus*										
	Mid *N. asperus*										
	P. asperopolus	1649.0	0				1649.0	0			
	U.Md-P.asp	1665.5					1906.3				
	Upper *M. diversus*	1965.0	1				1988.7	2	1965.0	1	
	Mid *M. diversus*										
	Lower *M. diversus*										
	Upper *L. balmei*	2014.0	2				2033.3	1			
	Lower *L. balmei*	2050.5	2				2505.0	1			
LATE CRETACEOUS	Upper *T. longus*	2536.0	1				2880.4	0			
	Lower *T. longus*	3038.4	1				3246.7	1			
	T. lilliei	3324.0	2				3403.0	2			
	N. senectus										
	T. apoxyexinus										
	P. mawsonii										
	A. distocarinatus										
EARLY CRET.	*P. pannosus*										
	C. paradoxa										
	C. striatus										
	C. hughesi										
	F. wonthaggiensis										
	C. australiensis										

COMMENTS: Dino. zones: M. druggii Zone (2536.0m); T. evittii Zone (2505.0-2496.5m); E. crassitabulata Zone (2259.0m); A. homomorphum Zone (2188.0-2033.3m); R. waipawaense Zone (1965.0m)

CONFIDENCE RATING:
- O: SWC or Core, Excellent Confidence, assemblage with zone species of spores, pollen and microplankton.
- 1: SWC or Core, Good Confidence, assemblage with zone species of spores and pollen or microplankton.
- 2: SWC or Core, Poor Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.
- 3: Cuttings, Fair Confidence, assemblage with zone species of either spores and pollen or microplankton, or both.
- 4: Cuttings, No Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: NEIL G. MARSHALL   DATE: 11/3/86

DATA REVISED BY: ____________   DATE: ____________

PALYNOLOGY DATA SHEET

BASIN: GIPPSLAND
ELEVATION: KB: +31 ft GL: 211 ft
WELL NAME: BATFISH-1
TOTAL DEPTH: 9761 feet

AGE	PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	*T. pleistocenicus*										
	M. lipsis										
	C. bifurcatus										
	T. bellus										
	P. tuberculatus	4765	1				4768	1			
PALEOGENE	Upper *N. asperus*										
	Mid *N. asperus*										
	Lower *N. asperus*										
	P. asperopolus	5004	1				5698	1			
	Upper *M. diversus*	5956	1				6102	1			
	Mid *M. diversus*										
	Lower *M. diversus*										
	Upper *L. balmei*										
	Lower *L. balmei*	6309	1				6740	2			
LATE CRETACEOUS	Upper *T. longus*	7332	1				8040	1			
	Lower *T. longus*	8100	2	8402	1		8562	1			
	T. lilliei	8604	2				9691	2			
	N. senectus										
	T. apoxyexinus										
	P. mawsonii										
	A. distocarinatus										
EARLY CRET.	*P. pannosus*										
	C. paradoxa										
	C. striatus										
	C. hughesi										
	F. wonthaggiensis										
	C. australiensis										

COMMENTS: Eisenackia crassitabulata Dinoflagellate Zone 6309' (2)
Depths in feet.

CONFIDENCE RATING:
- 0: SWC or Core, Excellent Confidence, assemblage with zone species of spores, pollen and microplankton.
- 1: SWC or Core, Good Confidence, assemblage with zone species of spores and pollen or microplankton.
- 2: SWC or Core, Poor Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.
- 3: Cuttings, Fair Confidence, assemblage with zone species of either spores and pollen or microplankton, or both.
- 4: Cuttings, No Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: LES/ADP DATE: June 1971; Dec. 1971
DATA REVISED BY: ADP/N.G. Marshall DATE: Jan. 1975; March 1986

PALYNOLOGY DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: 21.0 GL: -81.0

WELL NAME: KAHAWAI-1 TOTAL DEPTH: 2321 metres

AGE	PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	*T. pleistocenicus*										
	M. lipsis										
	C. bifurcatus										
	T. bellus										
	P. tuberculatus	1369.0	0				1389.0	0			
PALEOGENE	Upper *N. asperus*										
	Mid *N. asperus*	1391.2	2				1393.0	2			
	Lower *N. asperus*	1394.0	2				1396.1	2			
	P. asperopolus	1400.7	1				1426.6	0			
	Upper *M. diversus*	1472.1	2				1472.1	2			
	Mid *M. diversus*	1495.2	1				1528.5	2			
	Lower *M. diversus*	1554.6	1				1572.2	0			
	Upper *L. balmei*	1577.6	0				1687.8	1			
	Lower *L. balmei*	1738.2	0				1932.7	2	1895.6	1	
LATE CRETACEOUS	Upper *T. longus*	1960.3	1				2005.1				
	Lower *T. longus*	2065.6	2	2271.4	1		2307.5	2	2294.2	1	
	T. lilliei										
	N. senectus										
	T. apoxyexinus										
	P. mawsonii										
	A. distocarinatus										
EARLY CRET.	*P. pannosus*										
	C. paradoxa										
	C. striatus										
	C. hughesi										
	F. wonthaggiensis										
	C. australiensis										

COMMENTS: Depths in metres.

CONFIDENCE RATING:

- 0: SWC or Core, Excellent Confidence, assemblage with zone species of spores, pollen and microplankton.
- 1: SWC or Core, Good Confidence, assemblage with zone species of spores and pollen or microplankton.
- 2: SWC or Core, Poor Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.
- 3: Cuttings, Fair Confidence, assemblage with zone species of either spores and pollen or microplankton, or both.
- 4: Cuttings, No Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: M.K. Macphail DATE: 17 September, 1985

DATA REVISED BY: N.G. Marshall DATE: March, 1986

TABLE 1: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA FOR ANGELFISH-1

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	COMMENTS
SWC 60	1638.5	P. tuberculatus (o)	-		C. annulatus, P. simplex, N. balcombiana, T. vancompoae
SWC 59	1644.0	P. tuberculatus (2)	-		N. balcombiana
SWC 58	1649.0	P. asperopolus (o)	-	Early Eocene	P. asperopolus, P. pachypolus,
SWC 57	1665.5	U. M. diversus - P. asperopolus	-	Early Eocene	D. semilunatus, M. tenuis, P. tuberculiformis
SWC 56	1717.4	U. M. diversus - P. asperopolus	-	Early Eocene	I. notabilis, M. tenuis, P. pachypolus, H. tasmaniense
SWC 88	1752.2	U. M. diversus - P. asperopolus	-	Early Eocene	I. notabilis, M. tenuis, P. pachypolus, D. flounderense
SWC 55	1785.0	U. M. diversus - P. asperopolus	-	Early Eocene	M. tenuis, P. pachypolus, H. tasmaniense
SWC 87	1820.0	U. M. diversus - P. asperopolus	-	Early Eocene	M. tenuis, P. pachypolus, H. tasmaniense, P. ornatus, M. tenuis
SWC 54	1859.0	U. M. diversus - P. asperopolus	-	Early Eocene	I. notabilis, M. tenuis, P. pachypolus
SWC 53	1906.3	U. M. diversus - P. asperopolus	-	Early Eocene	P. pachypolus, H. tasmaniense
SWC 52	1933.0	U. M. diversus - P. asperopolus	-	Early Eocene	P. pachypolus, H. tasmaniense
SWC 51	1965.0	Upper M. diversus (1)	R. waipawaense (o)	Early Eocene	I. notabilis, R. waipawaense, H. tasmaniense
SWC 50	1988.7	Upper M. diversus		Early Eocene	I. notabilis, H. tasmaniense
SWC 49	2014.0	L. balmei	-	Paleocene	L. balmei
SWC 86	2033.3	Upper L. balmei (1)	A. homomorphum	Late Paleocene	L. balmei, P. incurvatus, P. langstonii
SWC 48	2050.5	L. balmei	-	Paleocene	L. balmei
SWC 46	2093.0	L. balmei	-	Paleocene	L. balmei, A. obscurus

NOTE: BRACKETED NUMBERS REFER TO CONFIDENCE RATINGS.

TABLE I: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA FOR ANGELFISH-I

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	COMMENTS
SWC 85	2153.8	L. balmei	-	Paleocene	L. balmei, P. langstonii
SWC 84	2188.0	L. balmei	A. homomorphum (o)	Paleocene	L. balmei, A. obscurus, P. langstonii, I. antipodus
SWC 43	2232.4	L. balmei		Paleocene	A. obscurus
SWC 83	2259.0	Lower L. balmei (2)	E. crassitabulata (2)	Paleocene	L. balmei, J. pieratus, I. antipodus, I. bakeri, E. crassitabulata
SWC 42	2280.0	Lower L. balmei (2)	-	Paleocene	L. balmei, S. regium
SWC 82	2312.2	Lower L. balmei (1)	-	Paleocene	L. balmei, T. verrucosus, A. obscurus
SWC 40	2379.2	Lower L. balmei (2)	-	Paleocene	L. balmei, A. obscurus
SWC 39	2415.7	Lower L. balmei (2)	-	Paleocene	L. balmei, T. verrucosus,
SWC 81	2453.0	Lower L. balmei (1)	-	Paleocene	L. balmei, T. verrucosus,
SWC 37	2496.5	Lower L. balmei (2)	T. evittii (o)	Early Paleocene	L. balmei, H. tubiferum, T. evittii
SWC 80	2505.0	Lower L. balmei (1)	T. evittii (o)	Early Paleocene	L. balmei, T. verrucosus, T. evittii, H. tubiferum
SWC 79	2509.8	indet	-	-	
SWC 34	2536.0	Upper T. longus (1)	M. druggii (o)	Maastrichtian	L. balmei, T. verrucosus, M. druggii
SWC 33	2541.6	T. longus	-	Maastrichtian	P. otwayensis, A. senonense
SWC 32	2548.0	T. longus	-	Maastrichtian	T. sectilis, Areoligera sp.
SWC 77	2575.2	Upper T. longus (1)	-	Maastrichtian	T. longus, S. punctatus

TABLE 1: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA FOR ANGELFISH-1

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	COMMENTS
SWC 30	2586.0	Upper T. longus (2)	-	Maastrichtian	L. balmei, S. punctatus, P. gemmatus
SWC 29	2611.5	Upper T. longus (2)	-	Maastrichtian	G. evansii, P. otwayensis, P. palisadus
SWC 76	2631.0	Upper T. longus (1)	-	Maastrichtian	C. horrendus, S. punctatus, P. gemmatus
SWC 28	2651.0	Indet	-		
SWC 75	2662.6	Upper T. longus (o)	-	Maastrichtian	S. punctatus, T. longus, Q. brossus
SWC 27	2680.3	Upper T. longus (1)	-	Maastrichtian	S. punctatus, P. gemmatus.
SWC 74	2706.5	Upper T. longus (1)	-	Maastrichtian	S. punctatus, T. verrucosus, P. palisadus
SWC 26	2738.0	Upper T. longus (1)	-	Maastrichtian	S. punctatus, P. otwayensis, Q. brossus
SWC 73	2767.1	Indet			
SWC 12	2827.2	Indet			
SWC 23	2880.4	Upper T. longus (o)	-	Maastrichtian	S. punctatus, T. longus, T. lilliei
SWC 22	2904.5	Indet			
SWC 20	3038.4	Lower T. longus (1)	-	Maastrichtian	C. horrendus, T. longus, Q. brossus.
SWC 17	3104.4	Lower T. longus (2)	-	Maastrichtian	G. evansii, P. otwayensis, S. regium.
SWC 13	3200.4	Indet	-		
SWC 9	3246.7	Lower T. longus (1)	-	Maastrichtian	T. longus,
SWC 8	3258.0	Indet	-		
SWC 7	3276.0	Indet	-		
SWC 3	3324.0	T. lilliei (2)	-	Campanian	T. lilliei, T. labrum
SWC 63	3357.5	Indet	-		
SWC 62	3382.2	Indet			
SWC 61	3403.0	T. lilliei (2)	-	Campanian	T. lilliei,

TABLE 2

ANOMALOUS AND UNUSUAL OCCURRENCES OF SPORE-POLLEN AND DINOFLAGELLATE TAXA IN ANGELFISH-1

SAMPLE NO.	DEPTH(m)	ZONE	TAXON	COMMENTS
SWC 29	2611.5	Upper *T. longus*	*Apectodinium homomorphum*	anomalously low record
SWC 34	2536.0	*M. druggii*	*Eisenackia* sp.	anomalously low record
SWC 80	2505.0	*T. evittii*	*Alisocysta rugolirata*	anomalously low record
SWC 39	2415.7	Lower *L. balmei*	*Apectodinium homomorphum*	anomalously low record
SWC 40	2379.2	Lower *L. balmei*	*Apectodinium homomorphum*	anomalously low record
SWC 83	2259.0	*E. crassitabulata*	*Proteacidites annularis*	anomalously low record
SWC 83	2259.0	*E. crassitabulata*	*Proteacidites incurvatus*	anomalously low record
SWC 83	2259.0	*E. crassitabulata*	*Juxtacolpus pieratus*	unusually high occurrence
SWC 83	2259.0	*E. crassitabulata*	*Apectodinium homomorphum*	anomalously low record
SWC 50	1988.7	Upper *M. diversus*	*Tricolpites incisus*	unusually low occurrence
SWC 51	1965.0	Upper *M. diversus*	*Spinizonocolpites* sp.	unusual occurrence

TABLE 3: SUMMARY OF BASIC PALYNOLOGICAL DATA FOR ANGELFISH-1

DIVERSITY -	low	medium	high
S & P	less than 10	10-30	greater than 30
D	1-3	3-10	10

SAMPLE NO.	DEPTH (m)	YIELD		DIVERSITY		PRESERVATION	LITHOLOGY	PYRIZATION	COMMENTS
		SPORE-POLLEN	DINOS	SPORE-POLLEN	DINOS				
SWC 60	1638.5	v. low	low	mod	mod	good	clyst.		
SWC 59	1644.0	low	low	low	low	good	clyst.		
SWC 58	1649.0	mod	mod	mod	low	good	clyst.		
SWC 57	1665.5	mod	low	mod	low	exc.	sltst.	mod	
SWC 56	1717.4	mod	mod	mod	mod	good	sltst.		
SWC 88	1752.2	mod	mod	mod	mod	fair	clyst.	mod	
SWC 55	1785.0	mod	mod	mod	mod	fair	sh.	high	
SWC 87	1820.0	high	low	mod	mod	exc	sltst.		
SWC 54	1859.0	low	low	mod	low	good	sandy sltst.		
SWC 53	1906.3	mod	mod	low	mod	poor	sh.	high	
SWC 52	1933.0	mod	mod	mod	mod	good	sst.	mod	
SWC 51	1965.0	mod	mod	mod	mod	good	sltst.		
SWC 50	1988.7	low	low	mod	mod	good	slty sst.		
SWC 49	2014.0	low	low	low	-	fair	carb. sltst.		
SWC 86	2033.3	mod	mod	mod	low	fair	carb. sh.		
SWC 48	2050.5	mod	-	mod	-	poor	carb. sh.	high	
SWC 46	2093.0	mod	-	mod	-	poor	coal		
SWC 85	2153.9	low	low	low	low	poor	slty sst.		
SWC 84	2188.0	mod	low	mod	low	fair-good	sandy sltst.		

TABLE 3: SUMMARY OF BASIC PALYNOLOGICAL DATA FOR ANGELFISH-1

DIVERSITY -	low	medium	high
S & P	less than 10	10-30	greater than 30
D	1-3	3-10	10

SAMPLE NO.	DEPTH (m)	YIELD SPORE-POLLEN	YIELD DINOS	DIVERSITY SPORE-POLLEN	DIVERSITY DINOS	PRESERVATION	LITHOLOGY	PYRIZATION	COMMENTS
SWC 43	2232.4	mod	-	low	-	good	coal		
SWC 83	2259.0	mod	low	high	mod	exc.	carb. sh.		
SWC 42	2280.0	mod	-	mod	-	poor	sltst.		
SWC 82	2312.2	mod	-	mod	-	poor-fair	sltst.		
SWC 40	2379.2	mod	mod	mod	low	poor	sltst.	high	
SWC 39	2415.7	mod	low	mod	low	fair	sh.	mod	
SWC 81	2453.0	mod	mod	mod	low	poor-fair	carb. sltst.	mod	
SWC 37	2496.5	low	high	low	mod	good	sltst.		
SWC 80	2505.0	mod	mod	mod	mod	good	sltst.	mod	
SWC 79	2509.8	low	low	low	low	poor	sltst.		
SWC 34	2536.0	v. low	mod	low	mod	fair-good	slty sst.		
SWC 33	2541.6	v. low	v. low	low	low	fair	sandy sltst.		
SWC 32	2548.0	low	low	low	low	fair	sst.		
SWC 77	2575.5	low	low	low	low	poor	slty sst.		
SWC 30	2586.0	mod	v. low	mod	low	fair	carb. sltst.		
SWC 29	2611.5	mod	v. low	mod	low	fair	sltst.		
SWC 76	2631.0	mod	-	mod	-	fair	sst.		
SWC 28	2651.0	v. low	v. low	low	low	fair	sltst.		

TABLE 3: SUMMARY OF BASIC PALYNOLOGICAL DATA FOR ANGELFISH-1

DIVERSITY -	low	medium	high
S & P	less than 10	10-30	greater than 30
D	1-3	3-10	10

SAMPLE NO.	DEPTH (m)	YIELD		DIVERSITY		PRESERVATION	LITHOLOGY	PYRIZATION	COMMENTS
		SPORE-POLLEN	DINOS	SPORE-POLLEN	DINOS				
SWC 75	2662.6	mod	-	mod	-	good	sh.		
SWC 27	2680.3	low	-	mod	-	fair	sltst.		
SWC 74	2706.5	low	-	low	-	fair	sst.		
SWC 26	2738.0	mod	-	mod	-	good	sh.		
SWC 73	2767.1	low	-	low	-	poor	sltst.		
SWC 25	2782.4	low	-	low	-	poor	sltst.		
SWC 72	2827.2	low	-	mod	-	fair	sltst.		
SWC 23	2880.4	mod	low	mod	low	fair	sltst.	mod	
SWC 22	2904.5	low	?low	low	?low	poor	slty coal		
SWC 20	3038.4	mod	-	mod	-	good	sltst.		
SWC 17	3104.4	low	-	low	-	fair	sltst.		
SWC 13	3200.4	low	-	mod	-	fair	sltst.		
SWC 9	3246.7	mod	v. low	mod	v. low	fair	sltst.		
SWC 8	3258.0	v. low	-	v. low	-	v. poor	sst.		
SWC 7	3276.0	low	-	low	-	poor	slst/sst.		
SWC 3	3324.0	low	-	low	-	poor	sltst.		
SWC 63	3357.5	low	-	mod	-	poor	sltst.		
SWC 62	3382.2	low	-	low	-	poor	sst/sltst.		
SWC 61	3403.0	low	v. low	mod	v. low	poor	sh.		

PE902359

This is an enclosure indicator page.
The enclosure PE902359 is enclosed within the container PE902361 at this location in this document.

The enclosure PE902359 has the following characteristics:

```
     ITEM_BARCODE = PE902359
CONTAINER_BARCODE = PE902361
             NAME = Palynological range chart
            BASIN = GIPPSLAND
           PERMIT =
             TYPE = WELL
          SUBTYPE = DIAGRAM
      DESCRIPTION = Palynological range chart
          REMARKS =
     DATE_CREATED =
    DATE_RECEIVED = 27/03/1987
             W_NO = W923
        WELL_NAME = Angelfish-1
       CONTRACTOR = ESSO
     CLIENT_OP_CO = ESSO Australia Limited
```

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 3

APPENDIX 3

APPENDIX 3

QUANTITATIVE LOG ANALYSIS

ANGELFISH-1

QUANTITATIVE LOG ANALYSIS

Interval: 1645 - 3410m KB

Analyst : L.J. Finlayson

Date : January, 1986

ANGELFISH-1 QUANTITATIVE LOG ANALYSIS

Angelfish-1 wireline logs have been analysed for effective porosity and water saturation over the interval 1645m - 3410m KB. Analysis was carried out over much of the logged section using a reiterative technique which incorporates hydrocarbon correction to the porosity logs, density-neutron crossplot porosities, a Dual Water saturation relationship and convergence on a preselected grain density window by shale volume adjustment. Over the intervals 2971-3090m and 3168-3410m poor hole conditions resulted in porosity being derived from the sonic log where the density-neutron log was not reading properly.

Logs Used

LLD, LLS (DLTE), MSFC, RHOB (LDTC), CAL, GR, NPHI (CNTH), SLS.

The neutron porosity log was corrected for borehole and environmental effects. The MSFC was used with the LLD and LLS to derive Rt and invasion diameter logs.

Log Quality

All logs appeared to be of reasonable quality however it is noted that sticky hole conditions during Suite 3 (17/12/85) has resulted in flat spots on some of the "Combo" tool logs. Therefore the calculated values of porosity and water saturation in this suite should be treated with some caution.

Please note that the Suite 1 ("Top Hole") BHC-GR was not run due to poor hole conditions.

Analysis Parameters

a	1
m	2
N	2
Grain Density - lower limit	2.65 gm/cc
Grain Density - upper limit	2.67 gm/cc
Mud Filtrate Density (RHOF)	1.00 gm/cc
Bottom Hole Temperature	100° C (Combo Suite 3)

Depth Interval (m)	RHOBSH (gm/cc)	NPHISH	RSH (ohm-m)
1645 - 2177	2.50	0.30	5
2177 - 2650	2.55	0.30	10
2650 - 2800	2.58	0.30	20
2800 - 3168	2.60	0.30	30
3168 - 3410	2.65	0.25	50

Depth Interval (m)	GR min (API units)	GR max (API units)	PHISH	RSH (ohm-m)
2971 - 3090	40	115	0.10	30
3168 - 3410	30	100	0.10	50

Shale Volume

An initial estimate of VSH was calculated from density-neutron separation.

$$VSHND = \frac{NPHI - \left(\frac{2.65 - RHOB}{1.65}\right)}{NPHISH - \left(\frac{2.65 - RHOBSH}{1.65}\right)} \qquad - 1$$

VSH was calculated from the Gamma Ray as follows:

$$VSHGR = \frac{GR - GR\ min}{GRmax - GRmin} \qquad - 2$$

Total Porosities

A. From density-neutron, total porosity was calculated as follows:

Total porosity was initially calculated from density-neutron logs using the following algorithms:

$$h = 2.71 - RHOB + NPHI\ (RHOF - 2.71) \qquad - 3$$

if h is greater than 0, then

apparent matrix density, $RHOMa = 2.71 - h/2$ - 4

if h is less than 0, then

apparent matrix density, $RHOMa = 2.71 - 0.64h$ - 5

Total porosity: $PHIT = \frac{RHOMa - RHOB}{RHOMa - RHOF}$ - 6

where RHOB = bulk density in gms/cc
NPHI = neutron porosity in limestone porosity units.
RHOF = fluid density (1.00 gms.cc)

B. From Sonic, total porosity was calculated as follows:

Total porosity: $PHIT = \frac{delta\ T - delta\ T.matrix}{delta\ T.fluid - delta\ T.matrix}$

where delta T = DT from SLS
delta T.matrix = 195 ms/m
delta T.fluid = 620 ms/m

Free Formation Water (Rw) and Bound Water (Rwb) Resistivities

Apparent water resistivity (Rwa) was derived as follows:

$$Rwa = Rt * PHIT^{m} \quad (m = 2) \qquad - 8$$

Free formation water resistivity (Rw) was taken from the clean, water sand Rwa. Bound water resistivity (Rwb) was calculated from the input shale resistivity value (RSH) read directly from the Rt log.

Listed below are the selected salinity values.

Depth Interval (m)	Salinity (ppm NaCleq.)
1645 - 1904	50,000
1904 - 2157	40,000
2157 - 2214	30,000
2214 - 2375	25,000
2375 - 2450	20,000
2450 - 2500	50,000
2500 - 2571	40,000
2571 - 2724	30,000
2724 - 2900	25,000
2900 - 3034	20,000
3034 - 3410	15,000

Water Saturations

Water saturations were determined from the Dual Water model which uses the following relationship:

$$\frac{1}{Rt} = SwT^{n} * \left(\frac{PHIT^{m}}{aRw}\right) + SwT^{(n-1)} \left[\frac{Swb * PHIT^{m}}{a}\left(\frac{1}{Rwb} - \frac{1}{Rw}\right)\right] \quad -8$$

or

$$\frac{1}{Rxo} = SxoT^{n} * \left(\frac{PHIT^{n}}{aRmf}\right) + SxoT^{(n-1)} \left[\frac{Swb * PHIT^{m}}{a}\left(\frac{1}{Rwb} - \frac{1}{Rmf}\right)\right] \quad -9$$

where: SwT and SxoT are "total" water saturations

and Swb (bound water saturation) $= \frac{VSH * PHISH}{PHIT}$ -10

where: PHISH = total porosity in shale.

with a = 1
m = 2
n = 2

A. Density-Neutron

Hydrocarbon correction to the porosity logs utilised the following algorithms:

RHOB = RHOB(raw) + 1.07 PHIT (1-SxoT) [(1.11-0.15P)RHOF - 1.15RHOH] -11
(Hydrocarbon corrected)

NPHI = NPHI(raw) + 1.3 PHIT (1-SxoT) $\frac{RHOF(1-P)-1.5RHOH + 0.2}{RHOF(1-P)}$ -12
(Hydrocarbon corrected)

where: P = mud filtrate salinity in parts per unity
RHOF = mud filtrate density
RHOH = hydrocarbon density (0.70 gm/cc for oil, 0.25 gm/cc for gas)

The calculated "grain density" was derived by removing the shale component from the rock using the following algorithms:

$$RHOBSC = \frac{RHOB\ (hydrocarbon\ corrected) - VSH * RHOBSH}{1 - VSH} \qquad -13$$

$$NPHISC = \frac{NPHI\ (hydrocarbon\ corrected) - VSH * NPHISH}{1 - VSH} \qquad -14$$

The shale corrected density and neutron values were then entered into the cross-plot algorithms (equations 3, 4 and 5) to derive grain density (RHOG).

If calculated RHOG fell inside the specified grain density window, then PHIE and Swe were calculated as follows:

$$PHIE = PHIT - VSH * PHISH \qquad -15$$

$$Swe = 1 - \frac{PHIT}{PHIE} (1-SwT) \qquad -16$$

If VSH was greater than 0.50 and PHIE less than 0.10, Swe was set to 1.

If the calculated RHOG fell outside the specified grain density window, VSH was adjusted appropriately and the process repeated.

B. Sonic:

Effective porosity and water saturation was calculated as follows:-

$$PHIE = PHIT - PHISH * VSH \qquad -18$$

where PHISH = PHIT in shales

$$Swe = 1 - \frac{PHIT}{PHIE} (1-SwT) \qquad -19$$

If VSH was greater than 0.50 and PHIE less than 0.10, Swe was set to 1.

Comments

1. Over the interval 3048.25 - 3289.5m KB a number of residual hydrocarbon and productive hydrocarbon zones are interpreted. The most significant of these is the oil sand over the interval 3122.0 - 3130.0m (6.75 net) and the gas sands over the interval 3142.0-3282.75m (24.25m net).
2. Water saturations and porosities below 3168m should be treated with some caution due to poor hole conditions during Suite 3 (17/12/85).
3. All sands over the interval 1645-3048.5m KB are interpreted as being water productive.
4. Attached is a Porosity/Depth Crossplot, a Porosity/Saturation Depth Plot and a listing of results.

ANGELFISH #1

SUMMARY OF RESULTS

Depth Interval (m KB)	Gross Thickness (m)	* Net Thickness (m)	*Porosity Average	* Swe Average	Fluid Content
1866.75 - 1877.50	10.75	10.75	0.236 ± 0.03	0.972	Water
1879.25 - 1902.75	23.50	22.25	0.241 ± 0.04	0.965	Water
1914.50 - 1918.25	3.75	3.50	0.194 ± 0.05	0.997	Water
1925.00 - 1927.25	2.25	2.25	0.206 ± 0.04	1.000	Water
1932.75 - 1946.75	14.00	13.25	0.214 ± 0.033	1.000	Water
1951.50 - 1956.25	4.50	4.25	0.189 ± 0.05	1.000	Water
1957.75 - 1962.50	4.75	4.75	0.219 ± 0.03	0.966	Water
1975.75 - 1990.50	14.75	13.00	0.223 ± 0.04	0.990	Water
1996.00 - 2000.00	4.00	4.00	0.233 ± 0.02	0.983	Water
2019.75 - 2023.75	4.00	3.75	0.182 ± 0.05	0.963	Water
2069.25 - 2071.25	2.00	2.00	0.206 ± 0.02	0.941	Water
2085.25 - 2092.75	7.50	6.00	0.193 ± 0.04	0.884	Water
2096.75 - 2099.25	2.50	2.50	0.213 ± 0.03	0.819	Water
2103.50 - 2107.50	4.00	3.75	0.204 ± 0.04	0.802	Water
2136.50 - 2151.00	14.50	14.50	0.232 ± 0.02	1.000	Water
2167.25 - 2176.75	9.50	9.00	0.208 ± 0.04	0.972	Water
2177.75 - 2180.50	2.25	1.50	0.144 ± 0.03	1.000	Water
2191.00 - 2194.25	3.25	3.25	0.213 ± 0.04	1.000	Water
2196.25 - 2200.00	3.75	3.75	0.192 ± 0.03	1.000	Water
2207.50 - 2211.25	3.75	3.75	0.232 ± 0.04	1.000	Water
2224.00 - 2228.50	4.50	3.75	0.161 ± 0.02	1.000	Water
2292.75 - 2299.25	6.50	6.50	0.208 ± 0.02	0.987	Water
2324.50 - 2326.00	1.50	1.50	0.151 ± 0.01	1.000	Water
2328.00 - 2331.25	3.25	3.25	0.212 ± 0.05	1.000	Water
2334.00 - 2337.00	3.00	2.50	0.157 ± 0.02	0.822	Water
2381.25 - 2385.25	4.00	4.00	0.218 ± 0.03	0.858	Water
2387.50 - 2392.25	4.75	4.75	0.174 ± 0.03	0.852	Water
2400.00 - 2406.25	6.25	6.25	0.201 ± 0.04	0.978	Water
2421.25 - 2424.25	3.00	3.00	0.121 ± 0.01	0.695	Water
2460.25 - 2491.50	31.25	31.25	0.208 ± 0.02	1.000	Water
2511.50 - 2536.75	25.25	25.25	0.217 ± 0.04	1.000	Water
2545.25 - 2547.00	1.75	1.75	0.135 ± 0.02	1.000	Water
2548.25 - 2558.75	10.50	10.50	0.193 ± 0.03	1.000	Water
2561.50 - 2564.00	2.50	2.50	0.197 ± 0.02	0.947	Water
2566.50 - 2568.75	2.25	2.00	0.158 ± 0.03	0.954	Water

Depth Interval (m KB)	Gross Thickness (m)	* Net Thickness (m)	*Porosity Average	* Swe Average	Fluid Content
2605.75 - 2608.25	2.50	2.00	0.146 ± 0.02	0.998	Water
2619.00 - 2624.75	5.75	5.50	0.161 ± 0.03	0.942	Water
2652.50 - 2657.50	5.00	5.00	0.185 ± 0.03	0.914	Water
2670.75 - 2678.25	7.50	7.50	0.186 ± 0.01	1.000	Water
2684.00 - 2692.50	8.50	8.50	0.174 ± 0.02	0.919	Water
2708.25 - 2710.25	2.00	2.00	0.163 ± 0.02	0.964	Water
2713.50 - 2717.50	4.00	4.00	0.177 ± 0.01	0.926	Water
2720.25 - 2728.75	8.50	8.50	0.176 ± 0.02	0.886	Water
2734.50 - 2736.75	2.25	2.25	0.156 ± 0.03	0.944	Water
2744.75 - 2747.75	3.00	3.00	0.171 ± 0.01	1.000	Water
2754.00 - 2762.25	8.25	8.25	0.192 ± 0.01	1.000	Water
2790.00 - 2792.75	2.75	2.75	0.168 ± 0.01	0.846	Water
2795.25 - 2799.50	4.25	4.25	0.153 ± 0.01	0.978	Water
2804.75 - 2809.75	5.00	5.00	0.161 ± 0.02	0.978	Water
2819.25 - 2822.75	3.50	3.50	0.137 ± 0.03	0.925	Water
2833.25 - 2835.75	2.50	2.50	0.113 ± 0.01	0.938	Water
2858.50 - 2860.25	1.75	1.75	0.118 ± 0.01	1.000	Water
2958.75 - 2961.75	3.00	3.00	0.159 ± 0.01	1.000	Water
3001.00 - 3004.25	3.25	3.25	0.142 ± 0.01	1.000	Water
3008.75 - 3010.75	2.00	2.00	0.138 ± 0.02	1.000	Water
3022.00 - 3027.00	5.00	4.00	0.143 ± 0.02	1.000	Water
3048.25 - 3054.00	5.75	5.75	0.173 ± 0.02	0.786	Residual Oil
3062.25 - 3065.50	3.25	1.50	0.113 ± 0.01	0.811	Residual Oil
3069.00 - 3070.00	1.00	1.00	0.142 ± 0.02	0.628	Residual Oil
3074.25 - 3077.75	3.50	1.75	0.127 ± 0.01	0.850	Residual Oil
3088.00 - 3088.50	0.50	0.50	0.151 ± 0.03	0.823	Residual Oil
3102.50 - 3103.00	0.50	0.50	0.132 ± 0.01	0.719	Residual Oil
3111.75 - 3112.75	1.00	1.00	0.131 ± 0.01	0.808	Residual Oil
3122.00 - 3130.00	8.00	6.75	0.141 ± 0.02	0.573 ± 0.10	Oil
3142.00 - 3148.75	6.25	6.00	0.137 ± 0.02	0.497 ± 0.09	Gas
3160.00 - 3162.75	2.75	2.75	0.145 ± 0.02	0.404 ± 0.08	Gas
3193.00 - 3195.50	2.50	2.50	0.147 ± 0.02	0.791	Residual Oil
3198.00 - 3198.50	0.50	0.50	0.110 ± 0.01	0.865	Residual Oil
3216.00 - 3218.00	2.00	2.00	0.137 ± 0.02	0.532 ± 0.10	Gas
3235.50 - 3237.50	2.00	1.75	0.136 ± 0.01	0.464 ± 0.09	Gas
3257.50 - 3258.50	1.00	1.00	0.133 ± 0.02	0.554 ± 0.10	Gas
3262.25 - 3265.75	3.50	3.50	0.112 ± 0.01	0.613 ± 0.10	Gas

Depth Interval (m KB)	Gross Thickness (m)	* Net Thickness (m)	*Porosity Average	* Swe Average	Fluid Content
3272.75 - 3276.25	3.50	2.75	0.121 ± 0.01	0.652 ± 0.10	Gas
3278.25 - 3282.75	4.50	4.50	0.128 ± 0.01	0.577 ± 0.10	Gas
3283.50 - 3289.50	6.00	6.00	0.143 ± 0.02	0.746	Residual Oil?
3297.25 - 3297.75	0.50	0.50	0.113 ± 0.01	0.670	Water
3330.25 - 3330.75	0.50	0.50	0.103 ± 0.01	0.611	Water
3344.75 - 3345.50	0.75	0.75	0.119 ± 0.01	0.641	Water
3381.00 - 3381.50	0.50	0.50	0.107 ± 0.01	0.855	Water

* Net Thickness, Porosity Average and Swe Average refer to zones with calculated porosities in excess of 10%.

Some zones annotated as being water bearing have calculated Sw values less than 100%. This is due to a combination of hole conditions, thin beds and shaly sands complicating our calculations.

30271/19-21

PE601126

This is an enclosure indicator page.
The enclosure PE601126 is enclosed within the container PE902361 at this location in this document.

The enclosure PE601126 has the following characteristics:

ITEM_BARCODE = PE601126
CONTAINER_BARCODE = PE902361
NAME = Quantitative Log Analysis
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = WELL_LOG
DESCRIPTION = Quantitative Log Analysis
REMARKS =
DATE_CREATED =
DATE_RECEIVED = 27/03/1987
W_NO = W923
WELL_NAME = Angelfish-1
CONTRACTOR = ESSO
CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 4

APPENDIX 4

WIRELINE TEST REPORT

ANGELFISH-1 RFT REPORT

SUMMARY

A series of RFT tests consisting of seven runs were made in the Angelfish-1 exploration well. The first four runs were made on 10-11 December, 1985, after drilling the 12 1/4 inch hole to 3178m KB (3157m SS) while the remaining three runs were made after reaching final well total depth of 3421m KB (3400m SS). The main objectives of these tests were to investigate oil and gas shows indicated on mudlogs or by log interpretation in sands between the interval 3048.25m KB (3027.25m SS) and 3289.5m KB (3268.5m SS). Results from this RFT program confirmed log interpretations that the Intra-Latrobe sands 3122.0-3130.0m KB (3101.0-3109.0m SS) and 3142.0-3148.75m KB (3121-3127.75m SS) were respectively oil and gas bearing.

RESULTS AND DISCUSSION

Run 1 consisted of 23 pretests taken with the Hewlett-Packard gauge over the interval between 1939.5m KB (1918.5m SS) and 3162.5m KB (3141.5m SS). Of the 23 pretests attempted, 16 were successful in providing formation pressures, 1 pretest was tight and 6 were seal failures. Run numbers 2 to 7 were sample runs consisting of a 12 gallon (45.4 litres) lower main chamber and a 2 3/4 gallon (10.4 litres) segregated chamber run with the Schlumberger RFT strain gauge. Sample run numbers 2 and 3 with seats located at 3127.0m KB (3106.0m SS) and 3143.0m KB (3122.0m SS) respectively recovered oil and gas. Run numbers 5 and 6 with seats located at 3285.0m KB (3264.0m SS) and 3194.3m B (3173.3m SS) both recovered waxy oil scums and small quantities of gas. Run numbers 4 and 7 had no recoveries due to either tight seats or seal failures. Full details of data collected in this program are given in Attachment 1. The main results which are illustrated in Figures 1 to 3 are:

(a) The presence of oil in the 8m gross sand interval 3122.0-3130.0m KB (3101.0-3109.0m SS) indicated by logs was confirmed by the recovery of 2000cc of 47.4° API gravity oil in RFT run no. 2 with the seat located at 3127.0m KB (3106.0m SS).

(b) The presence of gas in the 6.25m gross sand interval 3142.0-3148.75m KB (3121.0-3127.75m SS) indicated by logs was confirmed by the recovery of 4.7 cubic metres (166.2 cubic feet) of gas in RFT run no.3 with the seat located at 3143.0m KB (3122.0m SS). Measured gas gradient within this sand interval was 0.23 psi/m.

.../2

(c) A 6m gross residual oil column over the sand interval 3283.5-3289.5m KB (3262.5-3268.5m SS) identified on logs was confirmed by the recovery of waxy oil scums in run no. 5 with the seat located at 3285.0m KB (3264.0m SS).

(d) A 2.5m gross residual oil column over the sand interval 3193.0-3195.5m KB (3172.0-3174.5m SS) identified on logs was confirmed by the recovery of waxy oil scums in run no. 6 with the seat located at 3194.3m KB (3173.3m SS).

(e) The water gradient established in sands above 2000m KB (1979m SS) was 1.40 psi/m and was slightly drawndown relative to the original Gippsland aquifer pressures.

(f) The sands below 2921m KB (2900m SS) were increasingly abnormally pressured with increasing depth.

FIG 1: ANGELFISH−1 RFT SURVEY 1918−3264M SS

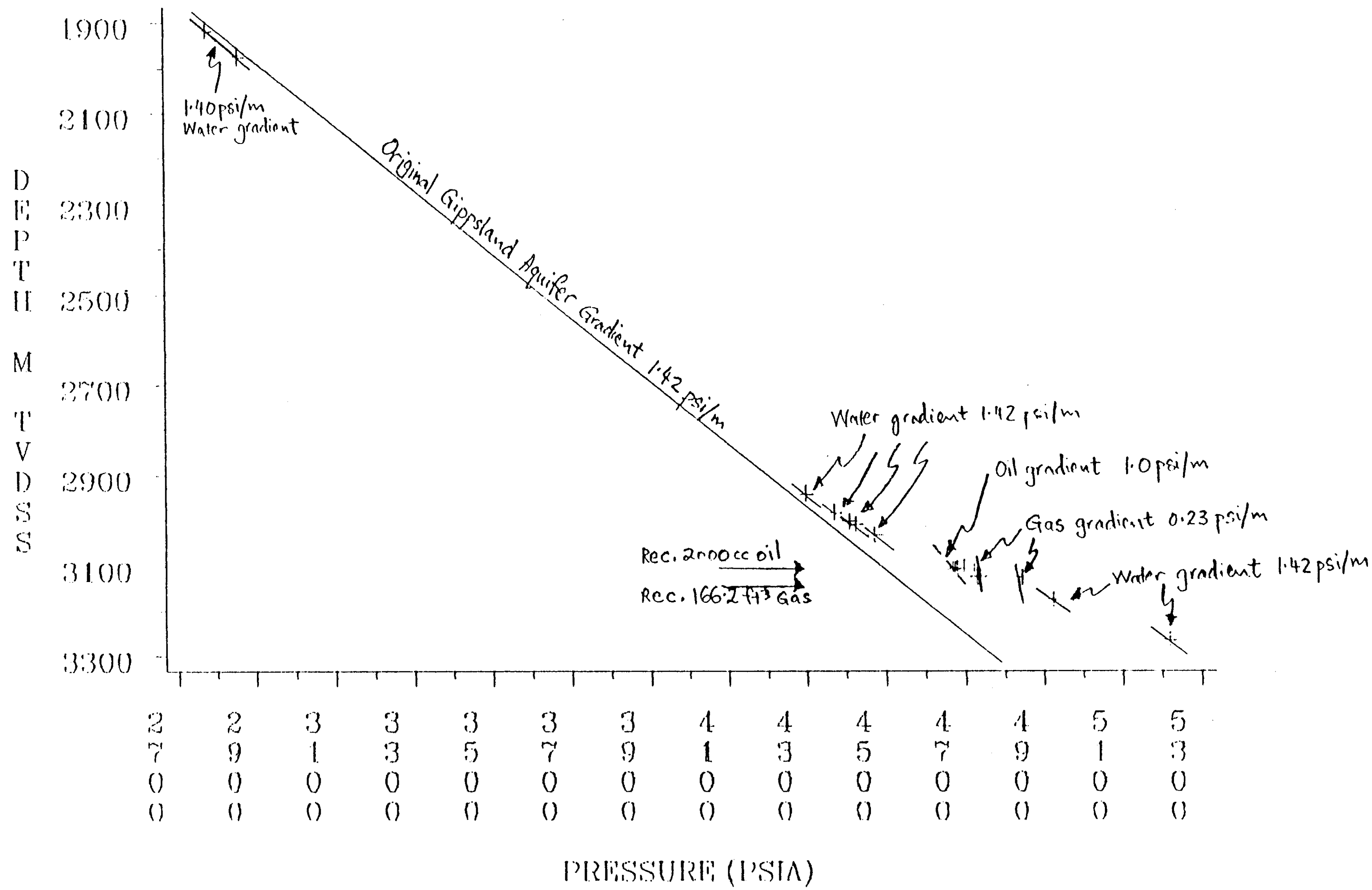

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FIG 2 : ANGELFISH-1 RFT SURVEY 2940-3174M SS

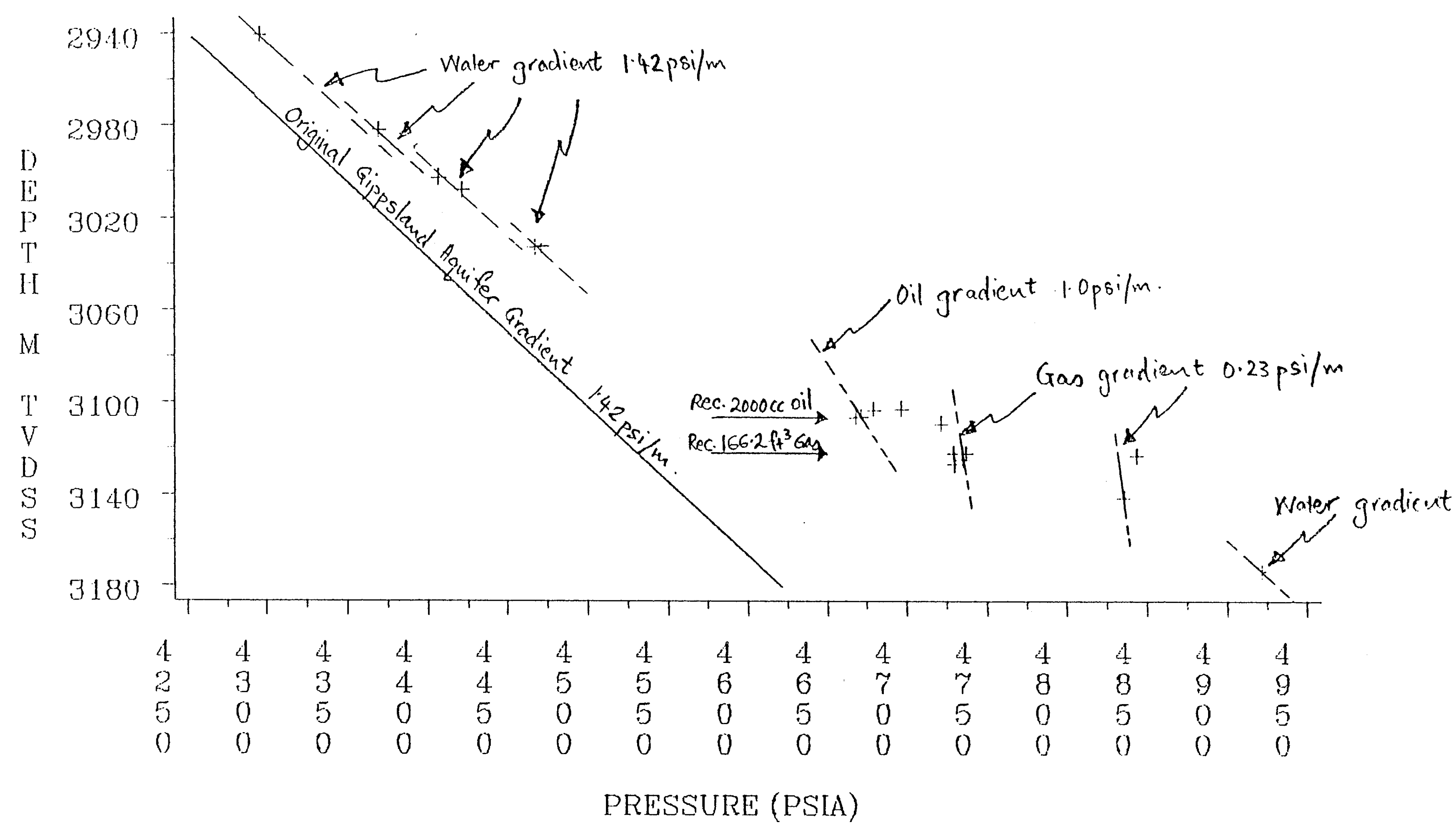

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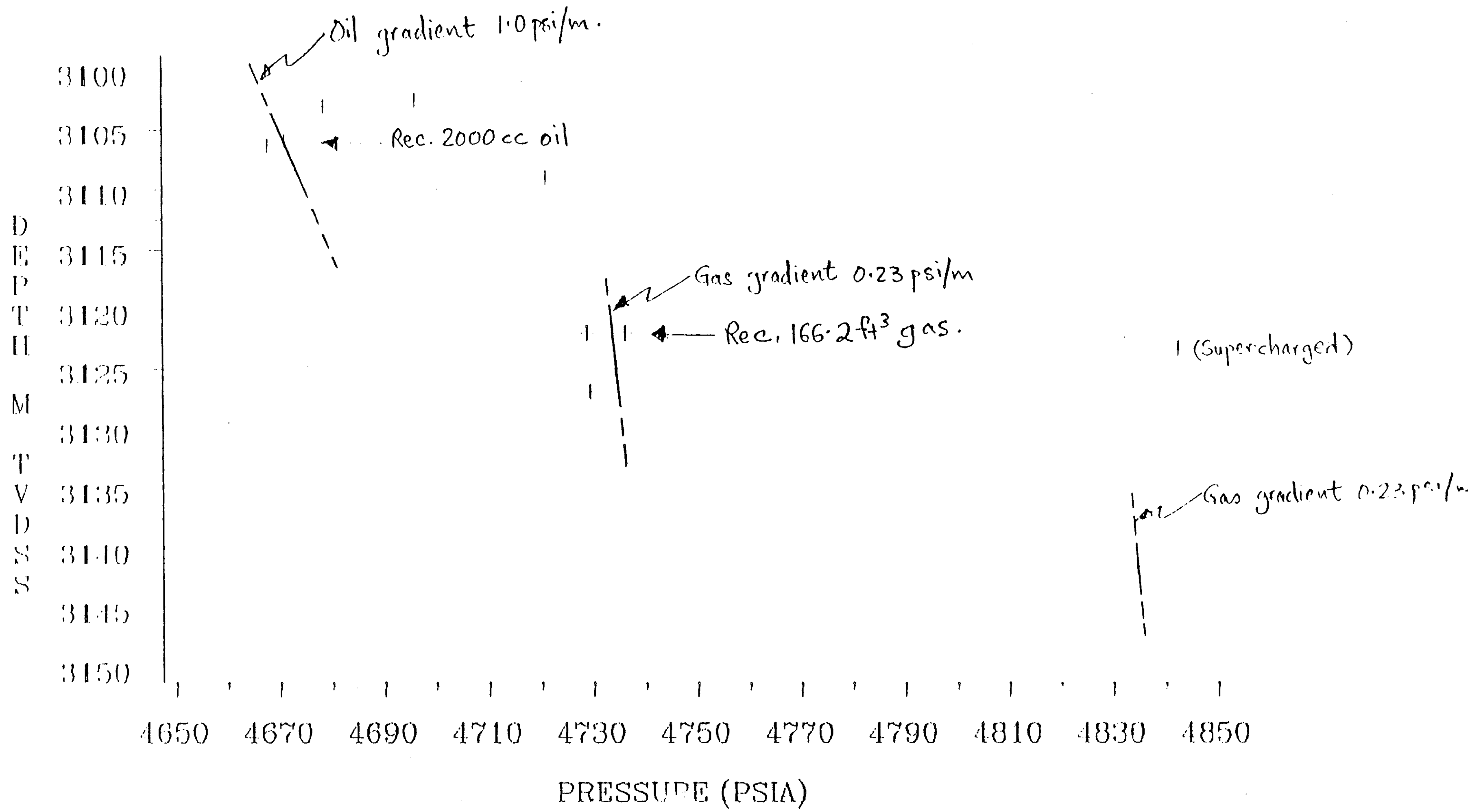
FIG 3 : ANGELFISH-1 RFT SURVEY 3102-3142M SS



EST 30MAY86

APPENDIX 5

APPENDIX 5

GEOCHEMICAL REPORT

GEOCHEMICAL REPORT
ANGELFISH-1 WELL, GIPPSLAND BASIN
AUSTRALIA

by

T.R. BOSTWICK

Sample handling and Analyses by:

- D. Ford	)	
- J. Johnston	)	
- H. Schiller	)	ESSO AUSTRALIA LTD.
- M. Sparke	)	
- A.C. Cook	)	UNIVERSITY OF WOLLONGONG

Esso Australia Ltd.
Geochemical Report

24th November, 1986

2454L

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDIX

ANGELFISH-1

INTRODUCTION

Canned cuttings and sidewall cores from the Angelfish-1 well, Gippsland Basin, have been analysed for their hydrocarbon source potential. Canned cuttings were collected at 15-metre intervals from 275mKB to total depth (T.D.) at 3421mKB. Alternate 15-metre samples were analysed for C_{1-4} headspace gases. Selected sidewall core samples were analysed for total organic carbon (TOC), Rock-Eval pyrolysis yields, kerogen isolation and elemental analysis, and vitrinite reflectance. Two liquid hydrocarbon samples, from RFT 2/24 at 3127mKB and RFT 3/27 at 3142mKB, were analysed by gas chromatography and for their API gravities.

The results of these analyses are recorded in Tables 1 through 6 and Figures 1 through 7. Detailed vitrinite reflectance descriptions are recorded in the Appendix.

RESULTS AND INTERPRETATIONS

Richness

The increase in C_{1-4} headspace cuttings gas yields (if indigenous) below 2000mKB to T.D. (Figure 1, Table 1) suggests that the Latrobe Group section encountered by the Angelfish-1 well might be organic-rich. This interpretation correlates well with the good to excellent TOC yields (in excess of 1.5%) encountered in some of the shales and siltstones within the section (Table 2, Figure 2). Pyrolysis S_2 yields (Table 3) indicative of fair to good hydrocarbon source potential were encountered within the 2014-2453mKB (Paleocene) and 2904.5-3382mKB (Late Cretaceous) intervals thereby confirming the hydrocarbon source potential of portions of the Latrobe Group Section.

Good TOCs were also encountered within the Flounder formation (Table 2, Figure 2), and pyrolysis yields indicate that fair hydrocarbon source potential exists at the 1785mKB, 1820mKB and 1906.2mKB levels.

Organic Matter Types

Hydrogen indices from Rock Eval pyrolysis indicate that most of the samples analysed contain Type III kerogen capable of generating gaseous hydrocarbons on maturity (Table 3b, Figure 3). A few of the Late Cretaceous samples in the 2904.5-3357.5mKB interval do appear to have some liquid or condensate potential.

The Type III gas-prone character of the section is confirmed by the atomic hydrogen:carbon ratios (Table 4b) when plotted against *approximate atomic oxygen:carbon ratios (Figure 4). It is possible that some terrestrially-sourced condensates and/or oily hydrocarbons may be sourced from the more hydrogen rich (atomic H/C greater than 0.85) samples in the Late Cretaceous.

Maturity

The interpreted best fit line drawn through the $R_v$max data in Figure 5 suggests that the terrestrially-dominated section encountered by the Angelfish-1 well becomes fully mature for liquid generation ($R_v$max =0.75%) around 3000mKB. This correlates well with the downhole increase of Tmax measurements (Table 3a) from Rock-Eval pyrolysis which exceed 435°C from 3038.4mKB. The apparent increase in wet gas (C_{2-4}) in the total C_{1-4} headspace gas from 2900mKB (Figure 1b) is probably another indication of the onset of maturity within the section.

Hydrocarbons

The whole oil chromatograms of two hydrocarbon liquids recovered from Angelfish-1 are shown in Figures 6 and 7. The liquid recovered from RFT 2/26 at 3127mKB is quite paraffinic and is dominated by C_{13}+ paraffins which exhibit a bimodal distribution that peak at C_{17} and C_{23} respectively. The liquid from RFT 3/27 at 3142mKB exhibits a typically mature paraffin distribution that has abundant gasoline-range hydrocarbons but decreasing amounts of heavier hydrocarbons as the carbon number increases. Both liquids show paraffin distributions through C_{30} (C_{33} for RFT 2/26). The API gravities of the liquids are 49° (3127mKB) and 50.5° (3142mKB) respectively. The high pristane relative to phytane contents (Figures 6, 7) together with the paraffinic character of the chromatograms infer a terrestrial source for the oils. Different maturity levels for sourcing are most likely responsible for the differences in paraffinic distributions with the 3142mKB liquid originating from a more mature source. It is possible that organic facies variations within the terrestrial source environment may also explain these differences.

* The atomic O/C ratio is approximate since the oxygen value (Table 4a) is calculated by difference and sulphur, which may be up to a few percent, was not determined.

CONCLUSIONS

1. The 2014-2453mKB and 2904.5-3382mKB intervals of the Latrobe Group sediments encountered by the Angelfish-1 well has good hydrocarbon source potential.

2. The organic matter within the section is predominantly Type III, terrestrial material capable of generating mainly gas. A few Late Cretaceous samples in the 2904.5-3357.5mKB interval may have some oil and/or condensate potential.

3. The section becomes fully mature for liquid hydrocarbon generation around 3000mKB.

4. The hydrocarbon liquids recovered from the well are paraffinic, terrestrially-sourced hydrocarbons whose compositional differences indicate that they have been sourced from different maturity levels.

FIGURE 1a

C_{1-4} CUTTINGS GAS LOG

ANGELFISH 1

GIPPSLAND BASIN

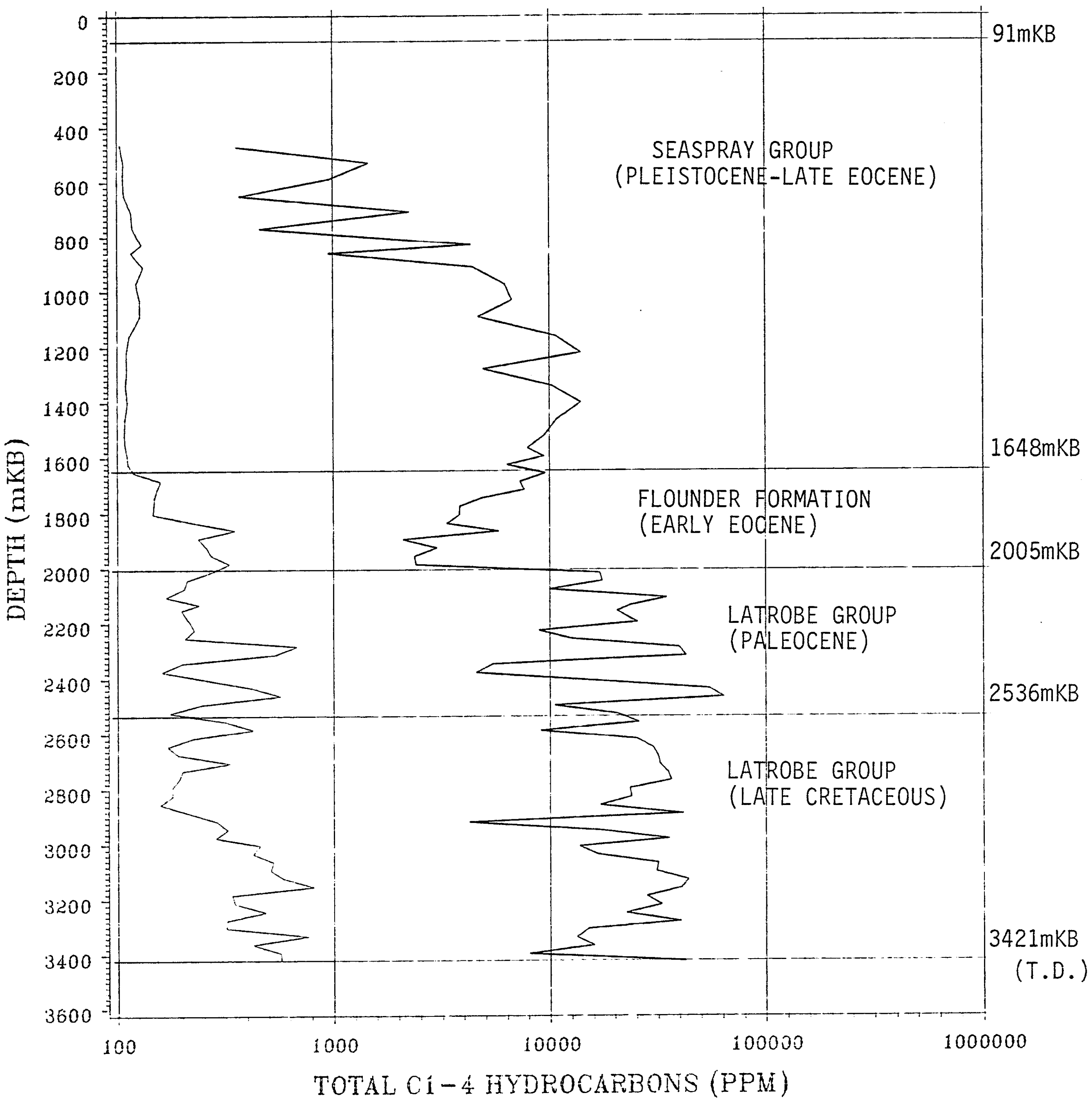


FIGURE 1b.

C_{1-4} CUTTINGS GAS LOG

ANGELFISH 1

GIPPSLAND BASIN

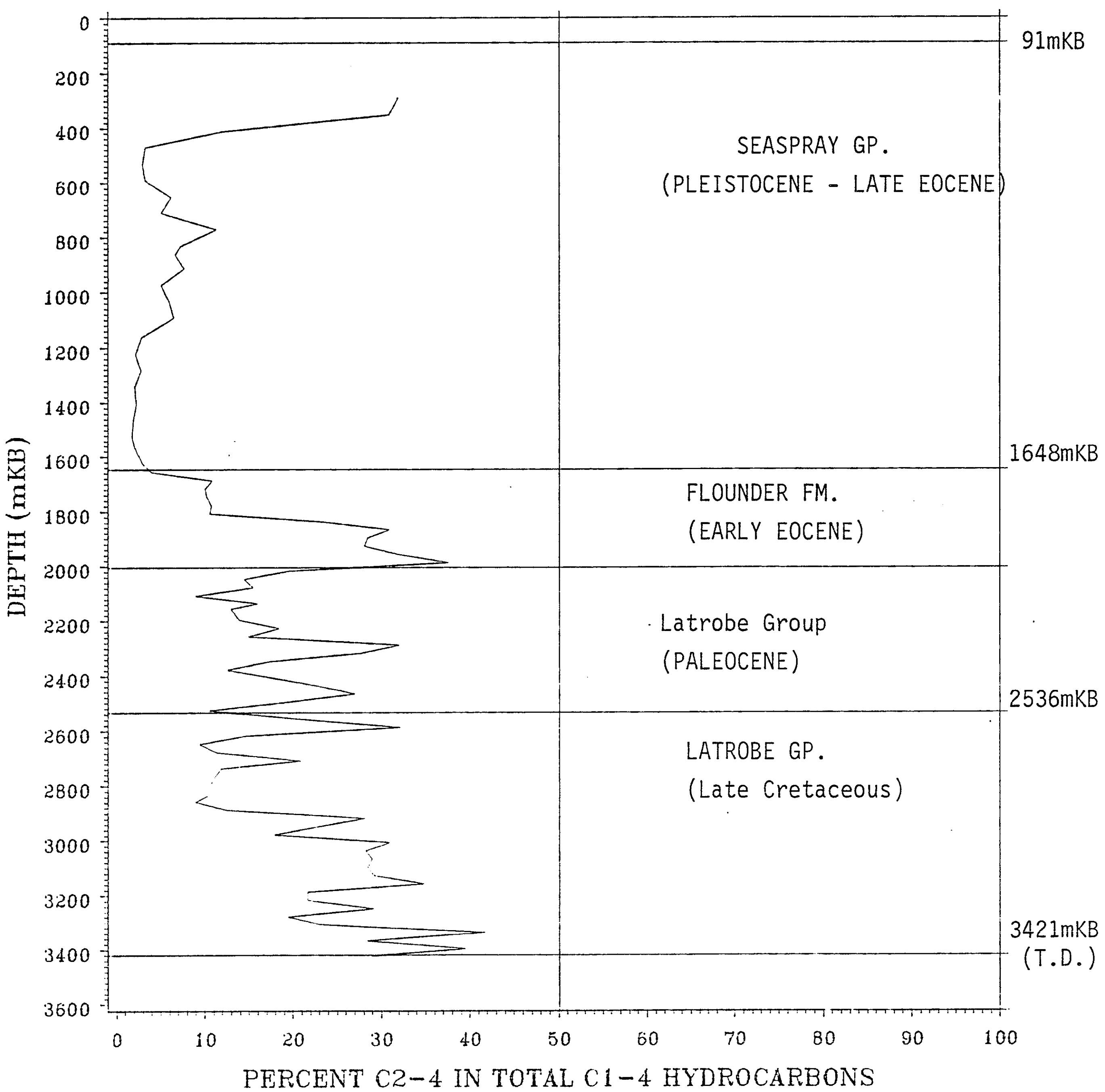


FIGURE 2

TOTAL ORGANIC CARBON

ANGELFISH 1

GIPPSLAND BASIN

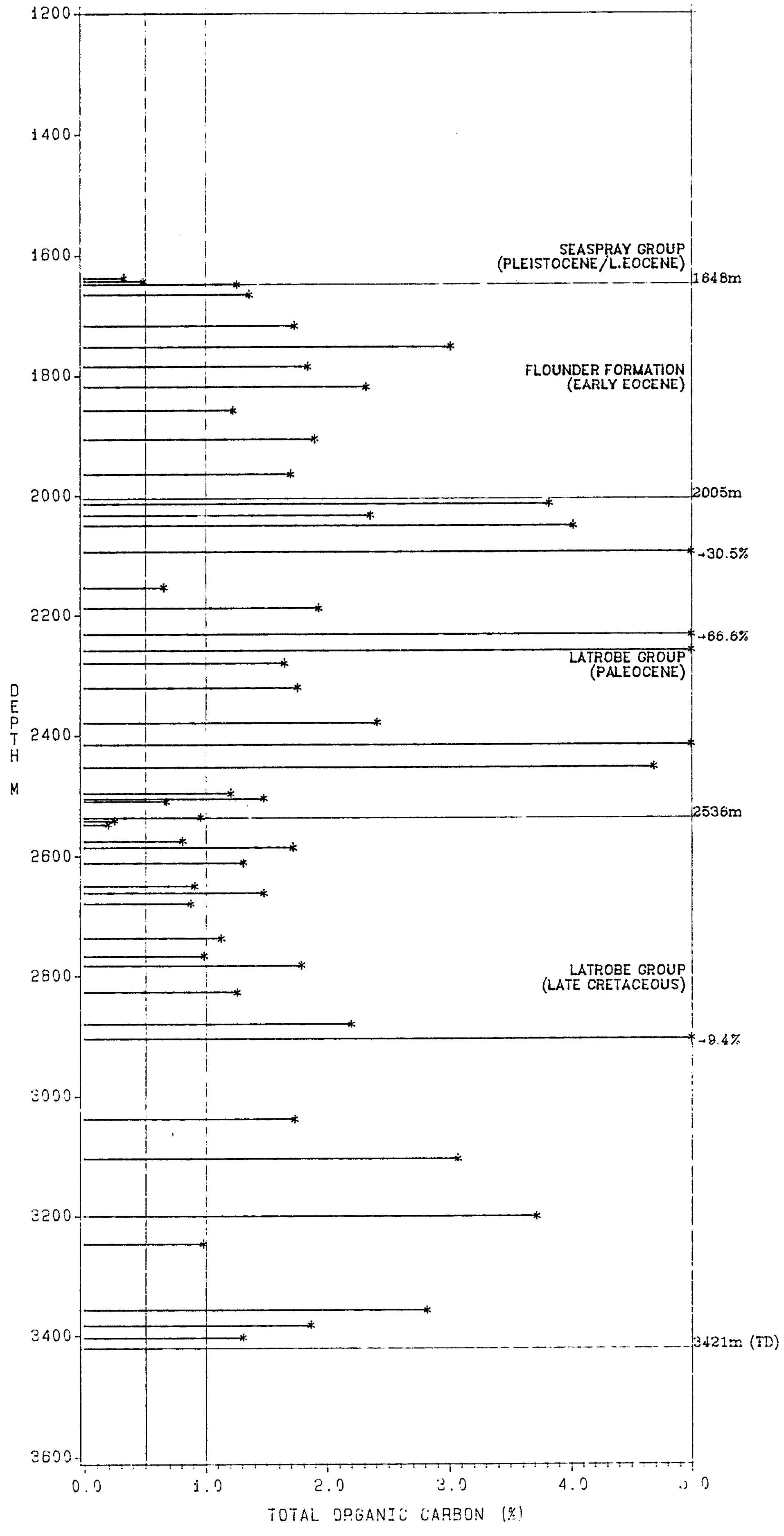


FIGURE 3

ROCKEVAL MATURATION PLOT

ANGELFISH 1

GIPPSLAND BASIN

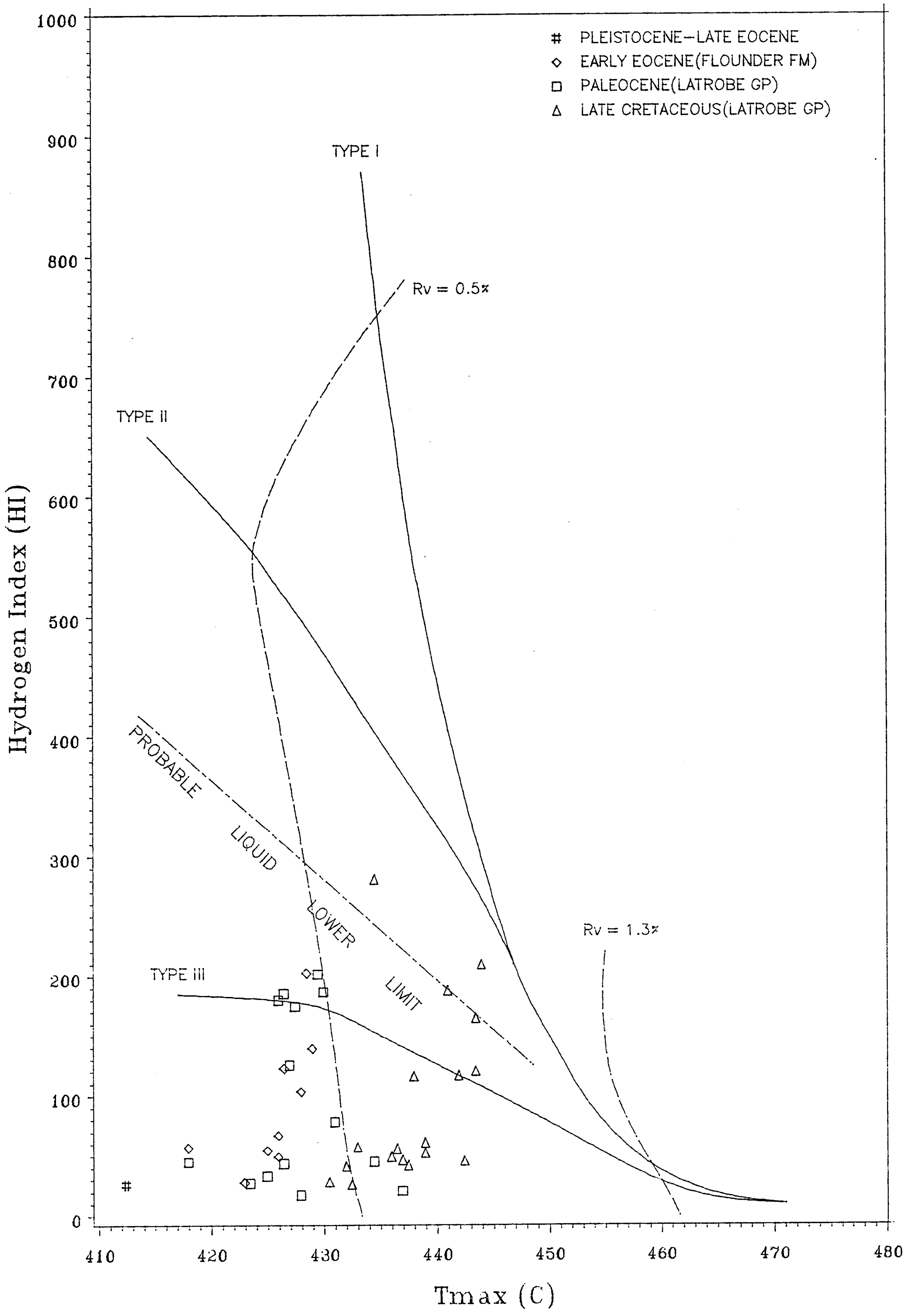


FIGURE 4

KEROGEN TYPE

ANGELFISH 1

GIPPSLAND BASIN

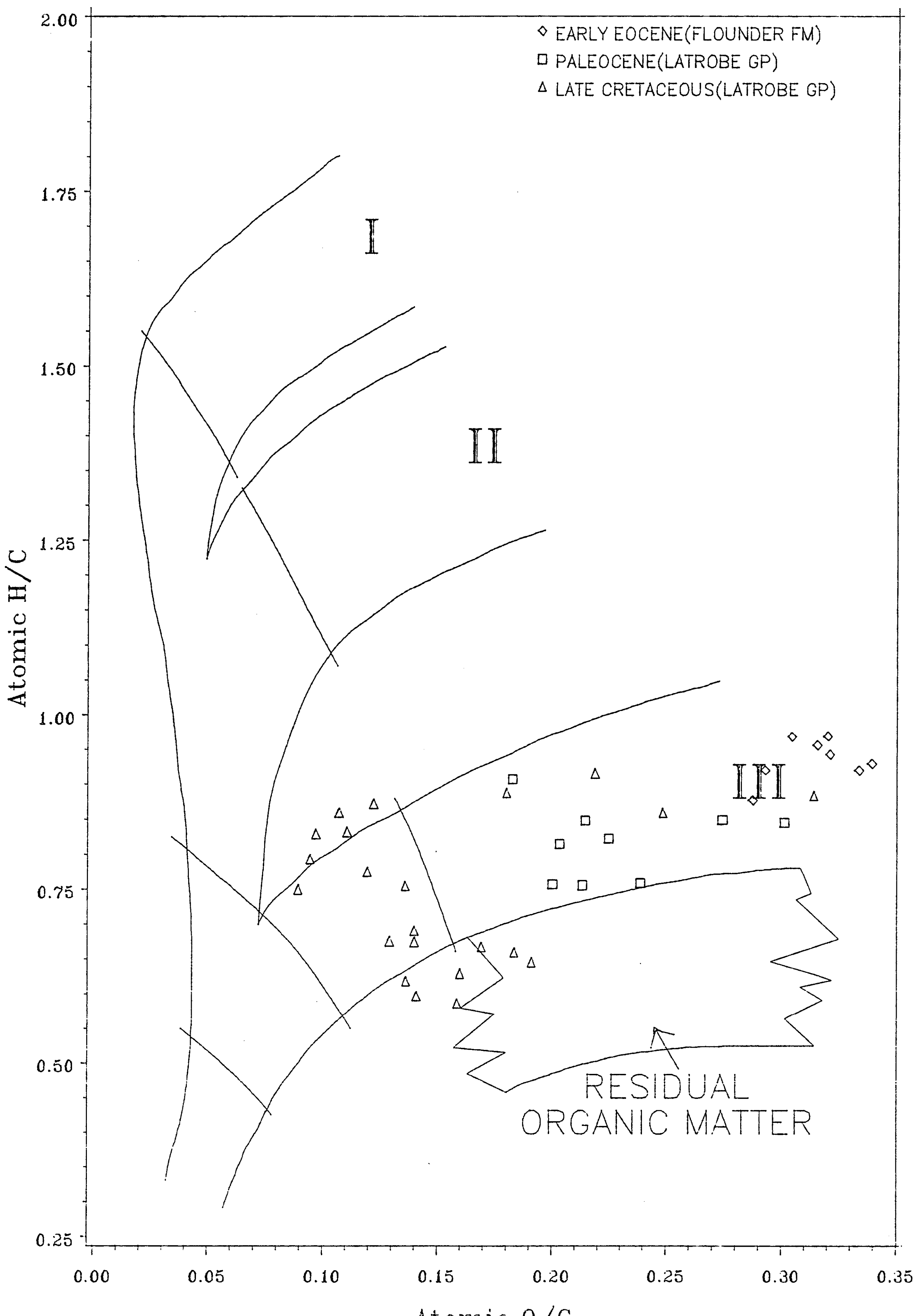


FIGURE 5

VITRINITE REFLECTANCE VS. DEPTH
ANGELFISH 1
GIPPSLAND BASIN

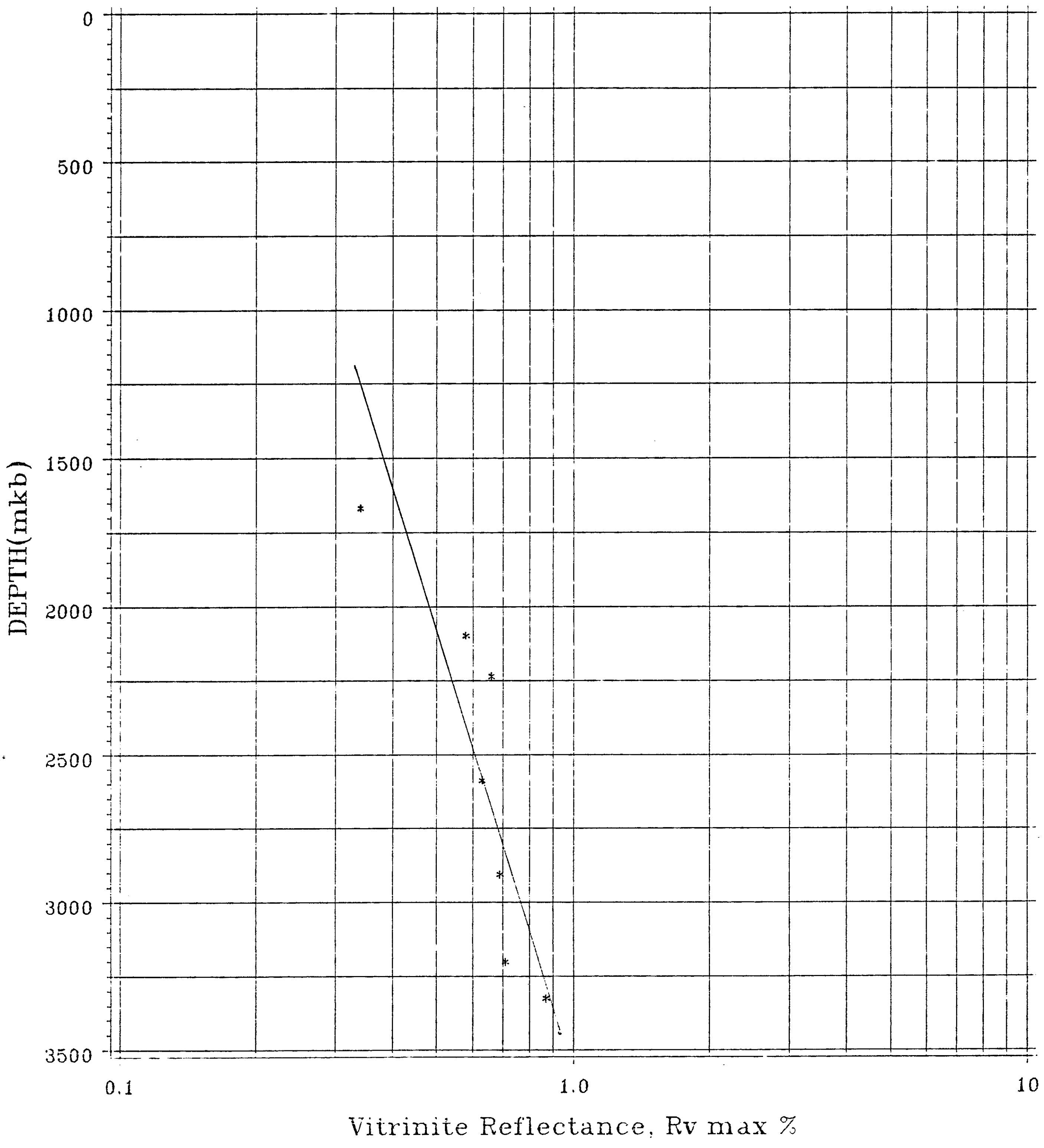


FIGURE 6.

WHOLE OIL CHROMATOGRAM

ANGELFISH-1

RFT 2/26 - 3127mKB

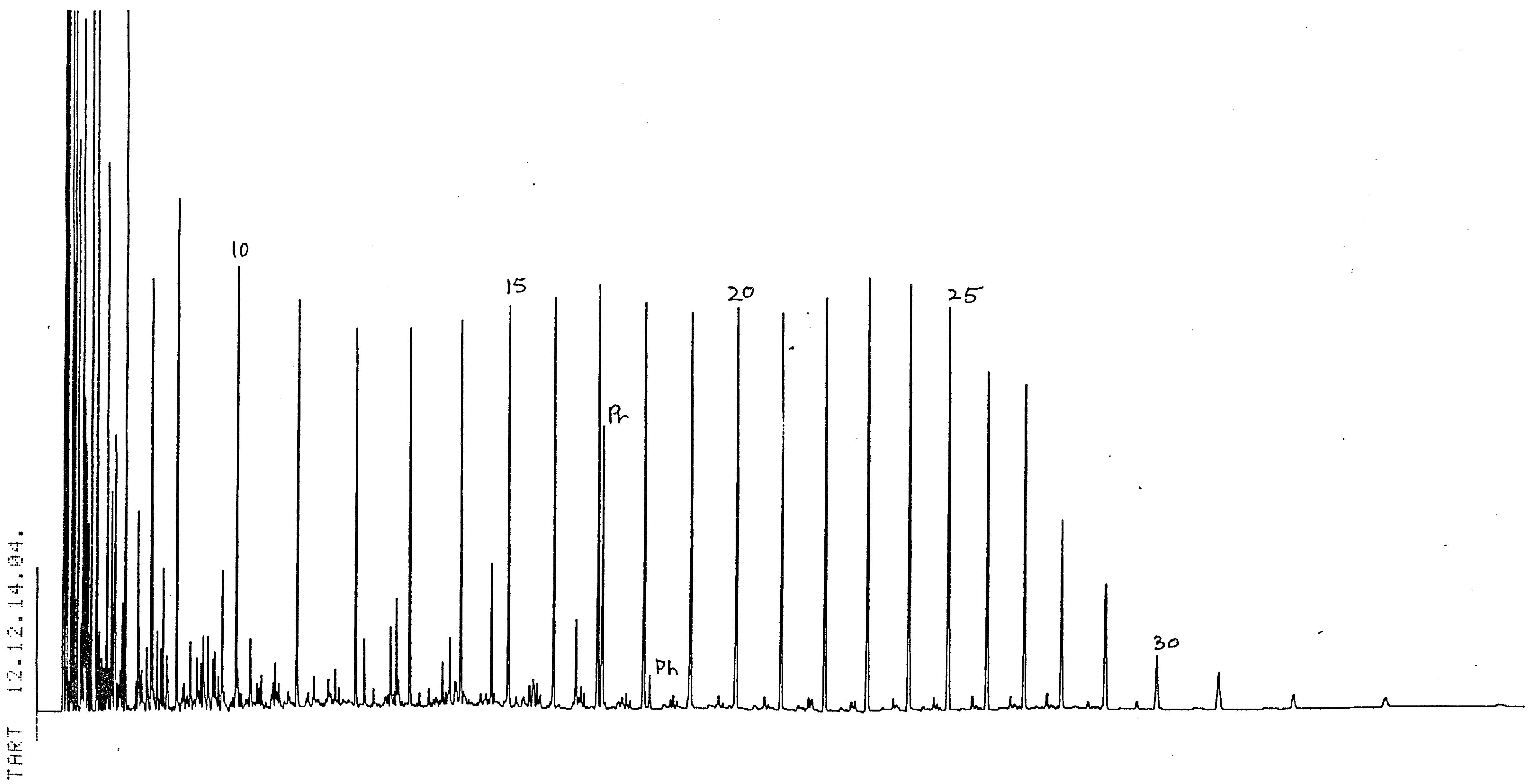


FIGURE 7.

WHOLE OIL GAS CHROMATOGRAM

ANGELFISH-1

RFT 3/27 - 3142mKB

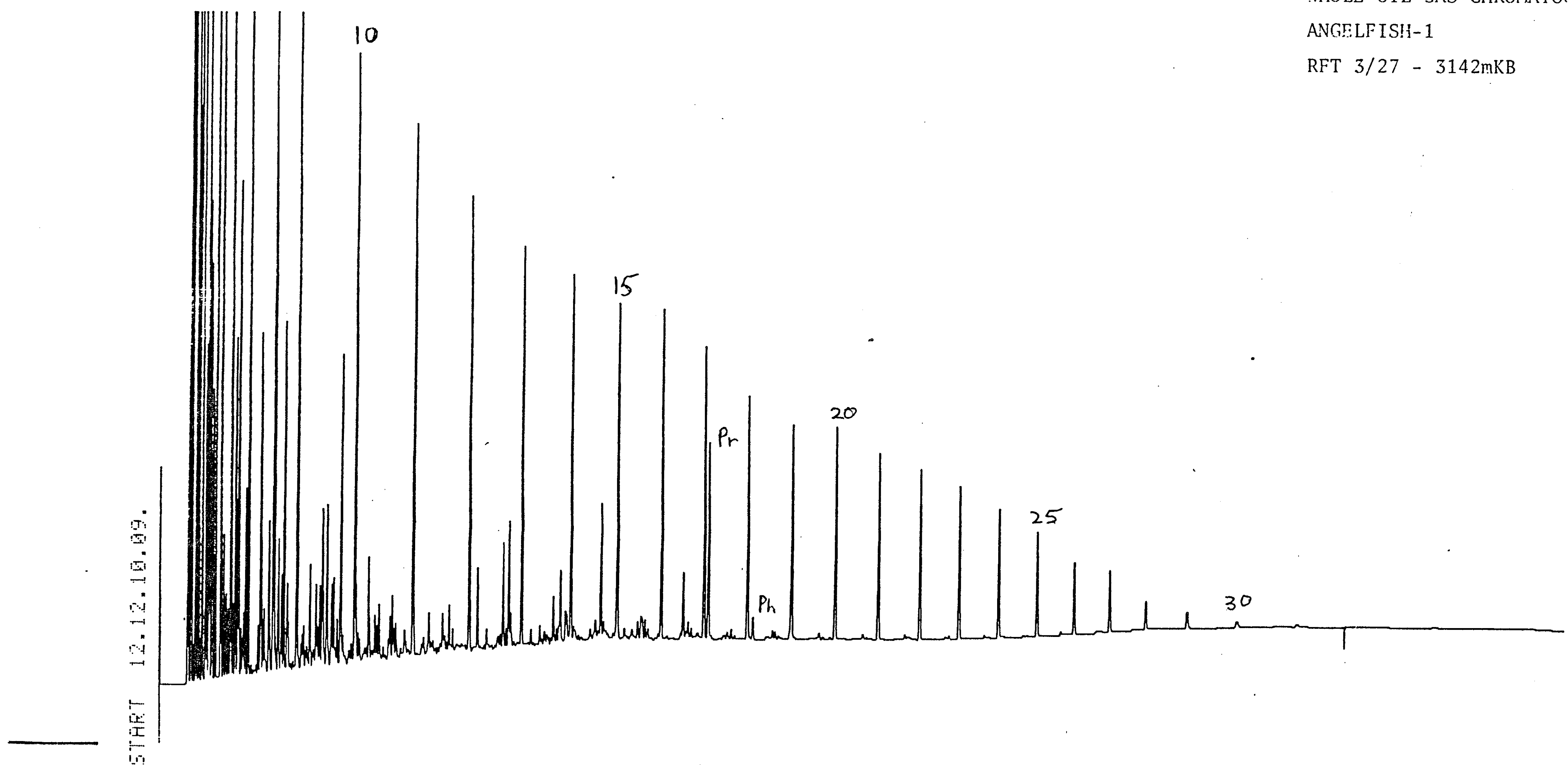


TABLE 1.

25/06/86

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C1-C4 HYDROCARBON ANALYSES

REPORT A - HEADSPACE GAS

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS) METHANE C1	ETHANE C2	PROPANE C3	IBUTANE IC4	NBUTANE C4	WET C2-C4	TOTAL C1-C4	WET/TOTAL PERCENT	GAS COMPOSITION (PERCENT) TOTAL GAS M	E	P	IB	NB	WET GAS E	P	IB	NB
77923 B	290.00	15	3	2	0	2	7	22	31.82	68.	14.	9.	0.	9.	43.	29.	0.	29.
77923 D	350.00	18	6	1	0	1	8	26	30.77	69.	23.	4.	0.	4.	75.	13.	0.	13.
77923 F	410.00	82	7	3	1	0	11	93	11.83	88.	8.	3.	1.	0.	64.	27.	9.	0.
77923 H	470.00	338	7	3	1	0	11	349	3.15	97.	2.	1.	0.	0.	64.	27.	9.	0.
77923 J	530.00	1428	19	13	8	2	42	1470	2.86	97.	1.	1.	1.	0.	45.	31.	19.	5.
77923 L	590.00	919	14	10	6	1	31	950	3.26	97.	1.	1.	1.	0.	45.	32.	19.	3.
77923 N	650.00	346	13	5	4	1	23	369	6.23	94.	4.	1.	1.	0.	57.	22.	17.	4.
77923 P	710.00	2150	67	29	15	3	114	2264	5.04	95.	3.	1.	1.	0.	59.	25.	13.	3.
77923 R	770.00	408	26	16	8	2	52	460	11.30	89.	6.	3.	2.	0.	50.	31.	15.	4.
77923 T	830.00	4023	239	53	14	6	312	4335	7.20	93.	6.	1.	0.	0.	77.	17.	4.	2.
77923 V	860.00	890	41	11	6	5	63	953	6.61	93.	4.	1.	1.	1.	65.	17.	10.	8.
77923 X	910.00	4080	208	88	28	15	339	4419	7.67	92.	5.	2.	1.	0.	61.	26.	8.	4.
77923 Z	970.00	5866	205	68	23	11	307	6173	4.97	95.	3.	1.	0.	0.	67.	22.	7.	4.
77924 B	1030.00	6301	277	87	25	12	401	6702	5.98	94.	4.	1.	0.	0.	69.	22.	6.	3.
77924 D	1090.00	4358	221	51	19	12	303	4661	6.50	93.	5.	1.	0.	0.	73.	17.	6.	4.
77924 F	1160.00	10476	224	52	16	8	300	10776	2.78	97.	2.	0.	0.	0.	75.	17.	5.	3.
77924 H	1220.00	13689	201	50	22	15	288	13977	2.06	98.	1.	0.	0.	0.	70.	17.	8.	5.
77924 J	1280.00	4760	45	48	27	15	135	4895	2.76	97.	1.	1.	1.	0.	33.	36.	20.	11.
77924 L	1340.00	9989	65	77	39	21	202	10191	1.98	98.	1.	1.	0.	0.	32.	38.	19.	10.
77924 N	1400.00	13659	112	123	52	27	314	13973	2.25	98.	1.	1.	0.	0.	36.	39.	17.	9.
77924 P	1460.00	10591	65	75	40	20	200	10791	1.85	98.	1.	1.	0.	0.	32.	38.	20.	10.
77924 R	1520.00	9195	56	55	29	15	155	9350	1.66	98.	1.	1.	0.	0.	36.	35.	19.	10.
77924 T	1565.00	7685	64	63	25	14	166	7851	2.11	98.	1.	1.	0.	0.	39.	38.	15.	8.
77924 V	1595.00	9181	93	95	33	17	238	9419	2.53	97.	1.	1.	0.	0.	39.	40.	14.	7.
77924 X	1625.00	6127	82	72	24	11	189	6316	2.99	97.	1.	1.	0.	0.	43.	38.	13.	6.
77924 Z	1655.00	9175	157	166	48	21	392	9567	4.10	96.	2.	2.	1.	0.	40.	42.	12.	5.
77925 B	1685.00	6450	396	283	78	31	788	7238	10.89	89.	5.	4.	1.	0.	50.	36.	10.	4.
77925 D	1715.00	6879	440	235	70	18	763	7642	9.98	90.	6.	3.	1.	0.	58.	31.	9.	2.
77925 F	1745.00	4340	307	127	51	11	496	4836	10.26	90.	6.	3.	1.	0.	62.	26.	10.	2.
77925 H	1775.00	3391	227	113	57	13	410	3801	10.79	89.	6.	3.	1.	0.	55.	28.	14.	3.
77925 J	1805.00	3405	161	141	73	28	403	3808	10.58	89.	4.	4.	2.	1.	40.	35.	18.	7.
77925 L	1835.00	2529	455	242	65	17	779	3308	23.55	76.	14.	7.	2.	1.	58.	31.	8.	2.
77925 N	1865.00	4025	991	629	129	57	1805	5830	30.96	69.	17.	11.	2.	1.	55.	35.	7.	3.
77925 P	1895.00	1487	283	227	56	25	591	2078	28.44	72.	14.	11.	3.	1.	48.	38.	9.	4.
77925 R	1925.00	2166	424	290	88	43	845	3011	28.06	72.	14.	10.	3.	1.	50.	34.	10.	5.
77925 T	1955.00	1605	335	284	89	46	754	2359	31.96	68.	14.	12.	4.	2.	44.	38.	12.	6.
77925 V	1985.00	1503	277	438	128	67	910	2413	37.71	62.	11.	18.	5.	3.	30.	48.	14.	7.
77925 X	2015.00	13727	2254	853	156	62	3325	17052	19.50	81.	13.	5.	1.	0.	68.	26.	5.	2.
77925 Z	2045.00	15031	1744	617	120	49	2530	17561	14.41	86.	10.	4.	1.	0.	69.	24.	5.	2.
77926 B	2075.00	8353	1040	400	70	26	1536	9889	15.53	84.	11.	4.	1.	0.	68.	26.	5.	2.
77926 D	2105.00	31832	2565	487	46	20	3118	34950	8.92	91.	7.	1.	0.	0.	82.	16.	1.	1.
77926 F	2135.00	19619	2703	870	136	62	3771	23390	16.12	84.	12.	4.	1.	0.	72.	23.	4.	2.
77926 H	2155.00	17684	1828	625	108	57	2618	20302	12.90	87.	9.	3.	1.	0.	70.	24.	4.	2.
77926 J	2195.00	21897	2472	843	136	97	3548	25445	13.94	86.	10.	3.	1.	0.	70.	24.	4.	3.
77926 L	2225.00	7225	1053	429	86	65	1633	8858	18.44	82.	12.	5.	1.	1.	64.	26.	5.	4.
77926 N	2255.00	10893	1505	342	42	14	1903	12796	14.87	85.	12.	3.	0.	0.	79.	18.	2.	1.
77926 P	2285.00	26942	10306	2207	143	116	12772	39714	32.16	68.	26.	6.	0.	0.	81.	17.	1.	1.

TABLE 1 (cont)

C1-C4 HYDROCARBON ANALYSES

REPORT A - HEADSPACE GAS

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS) METHANE C1	ETHANE C2	PROPANE C3	IBUTANE IC4	NBUTANE C4	WET C2-C4	TOTAL C1-C4	WET/TOTAL PERCENT	GAS COMPOSITION (PERCENT) TOTAL GAS M	E	P	IB	NB	WET GAS E	P	IB	NB
77926 R	2315.00	30905	9078	2325	240	174	11817	42722	27.66	72.	21.	5.	1.	0.	77.	20.	2.	1.
77926 T	2345.00	4476	670	221	26	24	941	5417	17.37	83.	12.	4.	0.	0.	71.	23.	3.	3.
77926 V	2375.00	3954	460	87	14	4	565	4519	12.50	87.	10.	2.	0.	0.	81.	15.	2.	1.
77926 Z	2435.00	42309	10121	2059	202	89	12471	54780	22.77	77.	18.	4.	0.	0.	81.	17.	2.	1.
77927 B	2465.00	46915	13105	3591	360	346	17402	64317	27.06	73.	20.	6.	1.	1.	75.	21.	2.	2.
77927 D	2495.00	8415	1334	520	70	94	2018	10433	19.34	81.	13.	5.	1.	1.	66.	26.	3.	5.
77927 F	2525.00	18433	1188	714	105	144	2151	20584	10.45	90.	6.	3.	1.	1.	55.	33.	5.	7.
77927 H	2555.00	20555	3282	1636	202	253	5373	25928	20.72	79.	13.	6.	1.	1.	61.	30.	4.	5.
77927 J	2585.00	6068	1840	883	89	85	2897	8965	32.31	68.	21.	10.	1.	1.	64.	30.	3.	3.
77927 L	2615.00	21526	2571	977	94	62	3704	25230	14.68	85.	10.	4.	0.	0.	69.	26.	3.	2.
77927 N	2645.00	27179	1943	699	91	72	2805	29984	9.35	91.	6.	2.	0.	0.	69.	25.	3.	3.
77927 P	2675.00	28083	2498	903	116	93	3610	31693	11.39	89.	8.	3.	0.	0.	69.	25.	3.	3.
77927 R	2705.00	25632	4782	1670	224	123	6799	32431	20.96	79.	15.	5.	1.	0.	70.	25.	3.	2.
77927 T	2735.00	31098	2983	962	142	74	4161	35259	11.80	88.	8.	3.	0.	0.	72.	23.	3.	2.
77927 V	2765.00	32450	2842	970	157	93	4062	36512	11.13	89.	8.	3.	0.	0.	70.	24.	4.	2.
77927 X	2795.00	20686	1584	700	112	70	2466	23352	10.56	89.	7.	3.	0.	0.	64.	28.	5.	3.
77927 Z	2825.00	21305	1584	800	106	77	2567	23872	10.75	89.	7.	3.	0.	0.	62.	31.	4.	3.
77928 B	2855.00	15456	774	598	57	76	1505	16961	8.87	91.	5.	4.	0.	0.	51.	40.	4.	5.
77928 D	2885.00	36177	3356	1560	159	150	5225	41402	12.62	87.	8.	4.	0.	0.	64.	30.	3.	3.
77928 F	2915.00	2999	612	448	70	53	1183	4182	28.29	72.	15.	11.	2.	1.	52.	38.	6.	4.
77928 H	2945.00	13320	2098	1439	233	182	3952	17272	22.88	77.	12.	8.	1.	1.	53.	36.	6.	5.
77928 J	2975.00	29385	3528	2115	394	333	6370	35755	17.82	82.	10.	6.	1.	1.	55.	33.	6.	5.
77928 L	3005.00	9373	2001	1601	330	289	4221	13594	31.05	69.	15.	12.	2.	2.	47.	38.	8.	7.
77928 N	3035.00	12065	2254	1776	372	335	4737	16802	28.19	72.	13.	11.	2.	2.	48.	37.	8.	7.
77928 P	3065.00	22428	4678	3364	598	526	9166	31594	29.01	71.	15.	11.	2.	2.	51.	37.	7.	6.
77928 R	3095.00	22262	4491	3192	580	568	8831	31093	28.40	72.	14.	10.	2.	2.	51.	36.	7.	6.
77928 T	3125.00	30912	8203	3719	428	398	12748	43660	29.20	71.	19.	9.	1.	1.	64.	29.	3.	3.
77928 V	3155.00	26253	10501	2972	367	312	14152	40405	35.03	65.	26.	7.	1.	1.	74.	21.	3.	2.
77928 X	3185.00	21825	3972	1610	200	228	6010	27835	21.59	78.	14.	6.	1.	1.	66.	27.	3.	4.
77928 Z	3215.00	25780	4910	1687	276	245	7118	32898	21.64	78.	15.	5.	1.	1.	69.	24.	4.	3.
77929 B	3245.00	15923	4401	1737	228	236	6602	22525	29.31	71.	20.	8.	1.	1.	67.	26.	3.	4.
77929 D	3275.00	32355	5287	2018	237	267	7809	40164	19.44	81.	13.	5.	1.	1.	68.	26.	3.	3.
77929 F	3305.00	11479	2162	1011	138	137	3448	14927	23.10	77.	14.	7.	1.	1.	63.	29.	4.	4.
77929 H	3335.00	7644	3067	1898	234	305	5504	13148	41.86	58.	23.	14.	2.	2.	56.	34.	4.	6.
77929 J	3365.00	11473	2414	1545	239	336	4534	16007	28.33	72.	15.	10.	1.	2.	53.	34.	5.	7.
77929 L	3395.00	4806	1679	1100	167	225	3171	7977	39.75	60.	21.	14.	2.	3.	53.	35.	5.	7.
77929 N	3421.00	29931	6926	4057	505	690	12178	42159	28.89	71.	16.	10.	1.	2.	57.	33.	4.	6.

TABLE 2.

TOTAL ORGANIC CARBON REPORT

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	AGE	FORMATION	AN	TOC%	AN	TOC%	AN	CO3%	DESCRIPTION
77893 T	1638.50	PLEISTOCENE/L.EOCENE	SEASPRAY GROUP	1	0.33		0.00	1	15.57	MED GRY CLYST
77893 S	1644.00	PLEISTOCENE/L.EOCENE	SEASPRAY GROUP	1	0.49		0.00	1	43.59	MED GRY SLTST
77893 R	1649.00	EARLY EOCENE	FLOUNDER FM	1	1.26		0.00	1	5.52	MED BRN SLTST
77893 Q	1665.50	EARLY EOCENE	FLOUNDER FM	1	1.36		0.00	1	4.26	MED-DK BRN SLTST
77893 P	1717.40	EARLY EOCENE	FLOUNDER FM	1	1.73		0.00	1	4.11	LT BRN/MED BRN SLTST
77894 O	1752.20	EARLY EOCENE	FLOUNDER FM	1	3.01		0.00	1	4.36	MED-DK BR CLYST,SLTY.
77893 O	1785.00	EARLY EOCENE	FLOUNDER FM	1	1.84		0.00	1	14.21	LT-MED BRN SHALE
77894 N	1820.00	EARLY EOCENE	FLOUNDER FM	1	2.32	1	1.79	1	4.32	MED BRN SHALE
77893 N	1859.00	EARLY EOCENE	FLOUNDER FM	1	1.23		0.00	1	8.74	LT GRY SDY SLTST
77893 M	1906.30	EARLY EOCENE	FLOUNDER FM	1	1.90		0.00	1	3.21	DK BRN SLTST
77893 K	1965.00	EARLY EOCENE	FLOUNDER FM	1	1.70	1	1.46	1	4.53	MED BRN SLTST
77893 I	2014.00	PALEOCENE	LATROBE GROUP	1	3.82		0.00	1	3.72	DK GRY-BLK SHALE
77894 M	2033.30	PALEOCENE	LATROBE GROUP	1	2.35		0.00	1	6.30	BL CARB.SHALE
77893 H	2050.50	PALEOCENE	LATROBE GROUP	1	4.02		0.00	1	3.76	DK GRY SHALE
77893 F	2095.00	PALEOCENE	LATROBE GROUP	1	30.49		0.00	1	2.62	DK GRY-BLK V.COALY SLTST
77894 L	2153.80	PALEOCENE	LATROBE GROUP	1	0.66		0.00	1	31.09	MED-DK GRY SDY SLTST
77894 K	2188.00	PALEOCENE	LATROBE GROUP	1	1.93		0.00	1	2.33	WT-LT BR SDY SLTST
77893 D	2232.40	PALEOCENE	LATROBE GROUP	1	66.57		0.00	1	0.65	BLACK COAL
77894 J	2259.00	PALEOCENE	LATROBE GROUP	1	5.26		0.00	1	13.11	DK GRY-BLK COALY SHALE
77893 C	2280.00	PALEOCENE	LATROBE GROUP	1	1.65	1	1.63	1	3.43	MED BRN SDY SLTST
77894 I	2321.20	PALEOCENE	LATROBE GROUP	1	1.76	1	1.31	1	1.98	MED BRN/LT GRY SLTST
77893 B	2379.20	PALEOCENE	LATROBE GROUP	1	2.41	1	1.91	1	2.81	MED BRN SLTST
77893 A	2415.70	PALEOCENE	LATROBE GROUP	1	5.17	1	4.52	1	3.89	DK GRY SLTST
77894 H	2453.00	PALEOCENE	LATROBE GROUP	1	4.69	1	4.08	1	3.73	MED-DK BRN SLTST
77892 Z	2496.50	PALEOCENE	LATROBE GROUP	1	1.21	1	1.04	1	7.35	DK BRN SDY SLTST
77894 G	2505.00	PALEOCENE	LATROBE GROUP	1	1.48	1	1.40	1	7.15	MED-DK BRN SLTST
77894 F	2509.80	PALEOCENE	LATROBE GROUP	1	0.68	1	0.84	1	4.55	LT-MED GRY SDY SLTST
77892 Y	2536.00	LATE CRETACEOUS	LATROBE GROUP	1	0.96		0.00	1	6.06	LT-MED GRY/DK GRY SST
77892 X	2541.60	LATE CRETACEOUS	LATROBE GROUP	1	0.25		0.00	1	5.22	LT-MED GRY SST
77892 W	2548.00	LATE CRETACEOUS	LATROBE GROUP	1	0.20		0.00	1	4.22	LT GRY/DK GRY SST
77894 E	2575.20	LATE CRETACEOUS	LATROBE GROUP	1	0.81		0.00	1	3.54	LT-MED GRY SST
77892 V	2586.00	LATE CRETACEOUS	LATROBE GROUP	1	1.72	1	1.61	1	4.04	MED-DK GRY CARB SLTST
77892 U	2611.50	LATE CRETACEOUS	LATROBE GROUP	1	1.31	1	1.78	1	4.72	MED GRY SLTST
77892 T	2651.00	LATE CRETACEOUS	LATROBE GROUP	1	0.91	1	0.92	1	3.57	MED BRN SDY SLTST
77894 C	2662.60	LATE CRETACEOUS	LATROBE GROUP	1	1.48		0.00	1	4.00	LT-MED GRY SHALE
77892 S	2680.30	LATE CRETACEOUS	LATROBE GROUP	1	0.88	1	0.90	1	3.87	MED GRY SLTST
77892 R	2738.00	LATE CRETACEOUS	LATROBE GROUP	1	1.13	1	1.04	1	3.40	DK GRY SLTST
77894 A	2767.10	LATE CRETACEOUS	LATROBE GROUP	1	0.99		0.00	1	3.33	MED GRY SDY SLTST
77892 Q	2782.40	LATE CRETACEOUS	LATROBE GROUP	1	1.79		0.00	1	4.55	MED-DK GRY SLTST
77893 Z	2827.20	LATE CRETACEOUS	LATROBE GROUP	1	1.26		1.16	1	3.85	LT-MED GRY SHALE
77892 P	2880.40	LATE CRETACEOUS	LATROBE GROUP	1	2.20	1	2.10	1	6.37	MED-DK GRY SLTST
77892 O	2904.50	LATE CRETACEOUS	LATROBE GROUP	1	9.43	1	14.40	1	2.64	DK GRY-BLK COALY SLTST
77892 N	3036.40	LATE CRETACEOUS	LATROBE GROUP	1	1.73		0.00	1	6.59	DK GRY MUDDY SLTST
77892 K	3104.40	LATE CRETACEOUS	LATROBE GROUP	1	3.07	1	3.19	1	2.47	DK GRY COALY SLTST
77892 I	3200.40	LATE CRETACEOUS	LATROBE GROUP	1	3.72		0.00	1	3.73	DK GRY COALY SLTST
77892 H	3246.70	LATE CRETACEOUS	LATROBE GROUP	1	0.98		0.00	1	8.34	DK BR-GY SLTST,CARB.

TABLE 2. (cont)

ESSO AUSTRALIA LTD.

TOTAL ORGANIC CARBON REPORT

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	AGE	FORMATION	AN	TOC%	AN	TOC%	AN	CO3%	DESCRIPTION
77893 W	3357.5	LATE CRETACEOUS	LATROBE GROUP	1	2.82		0.00	1	6.72	DK BRN SLTST
77893 V	3382.20	LATE CRETACEOUS	LATROBE GROUP	1	1.87		0.00	1	3.24	MED-DK GRY SDY SLTST
77893 U	3403.00	LATE CRETACEOUS	LATROBE GROUP	1	1.31	1	1.62	1	15.37	DK GRY SHALE

TABLE 3a.

18/09/86

ESSO AUSTRALIA LTD.

ROCK EVAL ANALYSES

REPORT A - SULPHUR & PYROLYZABLE CARBON

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	SAMPLE TYPE	AGE	TMAX	S1	S2	S3	PI	S2/S3	PC	COMMENTS
77893 S	1644.0	SWC	PLEIST-LATE EOCENE	413.	.04	.13	.00	.23	.13	.01	
77893 R	1649.0	SWC	EARLY EOCENE	425.	.07	.69	.04	.09	18.25	.06	
77893 Q	1665.5	SWC	EARLY EOCENE	423.	.04	.38	.06	.09	6.67	.03	
77893 P	1717.4	SWC	EARLY EOCENE	428.	.11	1.79	.00	.06	1.79	.16	
77894 O	1752.2	SWC	EARLY EOCENE	418.	.10	1.72	.79	.05	2.17	.15	
77893 O	1785.0	SWC	EARLY EOCENE	429.	.15	2.57	.30	.06	8.54	.23	
77894 N	1820.0	SWC	EARLY EOCENE	429.	.21	4.70	.12	.04	37.77	.41	
77893 N	1859.0	SWC	EARLY EOCENE	426.	.12	.61	.00	.16	.61	.06	
77893 M	1906.3	SWC	EARLY EOCENE	426.	.12	1.28	.07	.08	18.86	.12	
77893 K	1965.0	SWC	EARLY EOCENE	427.	.13	2.09	.09	.06	24.33	.18	
77893 I	2014.0	SWC	PALEOCENE	427.	.22	5.60	.19	.04	29.10	.48	
77894 M	2033.3	SWC	PALEOCENE	418.	.07	1.07	.52	.07	2.07	.09	
77893 H	2050.5	SWC	PALEOCENE	430.	.39	8.11	.23	.05	35.12	.71	
77894 L	2153.8	SWC	PALEOCENE	425.	.03	.22	.01	.11	16.00	.02	
77894 J	2259.0	SWC	PALEOCENE	430.	.35	9.83	.27	.03	36.48	.84	
77893 C	2280.0	SWC	PALEOCENE	431.	.14	1.29	.09	.09	14.89	.12	
77894 I	2321.2	SWC	PALEOCENE	428.	.22	3.08	.00	.07	3.08	.27	
77893 B	2379.2	SWC	PALEOCENE	435.	.06	1.10	.05	.05	22.60	.10	
77893 A	2415.7	SWC	PALEOCENE	426.	.40	9.31	.12	.04	80.75	.81	
77894 H	2453.0	SWC	PALEOCENE	427.	.33	5.90	.13	.05	47.15	.52	
77892 Z	2496.5	SWC	PALEOCENE	424.	.05	.33	.08	.12	4.00	.03	
77894 G	2505.0	SWC	PALEOCENE	427.	.04	.65	.00	.05	.65	.06	
77894 F	2509.8	SWC	PALEOCENE	437.	.01	.14	.07	.06	2.14	.01	
77892 Y	2536.0	SWC	LATE CRETACEOUS	428.	.03	.17	.00	.14	.17	.02	
77894 E	2575.2	SWC	LATE CRETACEOUS	433.	.03	.21	.00	.12	.21	.02	
77892 V	2586.0	SWC	LATE CRETACEOUS	438.	.07	.73	.00	.08	.73	.07	
77892 U	2611.5	SWC	LATE CRETACEOUS	431.	.06	.37	.12	.13	3.00	.04	
77892 T	2651.0	SWC	LATE CRETACEOUS	297.	.10	.15	.17	.38	.89	.02	
77894 C	2662.6	SWC	LATE CRETACEOUS	437.	.08	.69	.10	.10	7.20	.06	
77892 S	2680.3	SWC	LATE CRETACEOUS	432.	.04	.37	.08	.10	4.75	.03	
77892 R	2738.0	SWC	LATE CRETACEOUS	433.	.09	.65	.06	.12	11.17	.06	
77894 A	2767.1	SWC	LATE CRETACEOUS	443.	.07	.45	.06	.13	7.83	.04	
77892 Q	2782.4	SWC	LATE CRETACEOUS	437.	.16	1.00	.03	.14	35.00	.10	
77893 Z	2827.2	SWC	LATE CRETACEOUS	439.	.07	.77	.00	.08	.77	.07	
77892 P	2880.4	SWC	LATE CRETACEOUS	436.	.19	1.09	.09	.15	11.60	.11	
77892 O	2904.5	SWC	LATE CRETACEOUS	435.	1.29	26.46	.23	.05	113.25	2.30	
77892 N	3038.4	SWC	LATE CRETACEOUS	438.	.36	2.01	.17	.15	11.94	.20	
77892 K	3104.4	SWC	LATE CRETACEOUS	441.	.74	5.76	.10	.11	59.10	.54	
77892 I	3200.4	SWC	LATE CRETACEOUS	444.	.90	7.79	.07	.10	115.57	.72	
77892 H	3246.7	SWC	LATE CRETACEOUS	439.	.18	.51	.24	.26	2.15	.06	
77893 W	3357.5	SWC	LATE CRETACEOUS	444.	.88	4.65	.06	.16	83.00	.46	
77893 V	3382.2	SWC	LATE CRETACEOUS	444.	.37	2.25	.00	.14	2.25	.22	

PI=PRODUCTIVITY INDEX PC=PYROLYZABLE CARBON TC=TOTAL CARBON HI=HYDROGEN INDEX OI=OXYGEN INDEX

TABLE 3a (cont)

ESSO AUSTRALIA LTD.

ROCK EVAL ANALYSES

BASIN - GIPPSLAND
WELL - ANGELFISH 1

REPORT A - SULPHUR & PYROLYZABLE CARBON

SAMPLE NO.	DEPTH	SAMPLE TYPE	AGE	TMAX	S1	S2	S3	PI	S2/S3	PC	COMMENTS
77893 U	3403.0	SWC	LATE CRETACEOUS	442.	.43	1.53	.00	.22	1.53	.16	

PI=PRODUCTIVITY INDEX PC=PYROLYZABLE CARBON TC=TOTAL CARBON HI=HYDROGEN INDEX OI=OXYGEN INDEX

TABLE 3b.

18/09/86 ESSO AUSTRALIA LTD.

ROCK EVAL ANALYSES

BASIN - GIPPSLAND
WELL - ANGELFISH 1

REPORT B - TOTAL CARBON,H/O INDICES

SAMPLE NO.	DEPTH	SAMPLE TYPE	FORMATION	TC	HI	OI	HI/OI	COMMENTS
77893 S	1644.0	SWC	SEASPRAY GROUP	.49	26.	0.	.00	
77893 R	1649.0	SWC	FLOUNDER	1.26	55.	3.	18.25	
77893 Q	1665.5	SWC	FLOUNDER	1.36	28.	4.	6.67	
77893 P	1717.4	SWC	FLOUNDER	1.73	104.	0.	.00	
77894 O	1752.2	SWC	FLOUNDER	3.01	57.	26.	2.17	
77893 O	1785.0	SWC	FLOUNDER	1.84	139.	16.	8.54	
77894 N	1820.0	SWC	FLOUNDER	2.32	202.	5.	37.77	
77893 N	1859.0	SWC	FLOUNDER	1.23	50.	0.	.00	
77893 M	1906.3	SWC	FLOUNDER	1.90	67.	4.	18.86	
77893 K	1965.0	SWC	FLOUNDER	1.70	123.	5.	24.33	
77893 I	2014.0	SWC	LATROBE GROUP	3.02	186.	6.	29.10	
77894 M	2033.3	SWC	LATROBE GROUP	2.35	45.	22.	2.07	
77893 H	2050.5	SWC	LATROBE GROUP	4.02	202.	6.	35.13	
77894 L	2153.8	SWC	LATROBE GROUP	.66	33.	2.	16.00	
77894 J	2259.0	SWC	LATROBE GROUP	5.26	187.	5.	36.48	
77893 C	2280.0	SWC	LATROBE GROUP	1.65	78.	5.	14.89	
77894 I	2321.2	SWC	LATROBE GROUP	1.76	175.	0.	.00	
77893 B	2379.2	SWC	LATROBE GROUP	2.41	46.	2.	22.60	
77893 A	2415.7	SWC	LATROBE GROUP	5.17	180.	2.	80.75	
77894 H	2453.0	SWC	LATROBE GROUP	4.69	126.	3.	47.15	
77892 Z	2496.5	SWC	LATROBE GROUP	1.21	28.	7.	4.00	
77894 G	2505.0	SWC	LATROBE GROUP	1.48	44.	0.	.00	
77894 F	2509.8	SWC	LATROBE GROUP	.68	21.	10.	2.14	
77892 Y	2536.0	SWC	LATROBE GROUP	.96	18.	0.	.00	
77894 E	2575.2	SWC	LATROBE GROUP	.81	26.	0.	.00	
77892 V	2586.0	SWC	LATROBE GROUP	1.72	42.	0.	.00	
77892 U	2611.5	SWC	LATROBE GROUP	1.31	28.	9.	3.00	
77892 T	2651.0	SWC	LATROBE GROUP	.91	17.	19.	.89	
77894 C	2662.6	SWC	LATROBE GROUP	1.48	47.	6.	7.20	
77892 S	2680.3	SWC	LATROBE GROUP	.88	42.	9.	4.75	
77892 R	2738.0	SWC	LATROBE GROUP	1.13	57.	5.	11.17	
77894 A	2767.1	SWC	LATROBE GROUP	.99	46.	6.	7.83	
77892 Q	2782.4	SWC	LATROBE GROUP	1.79	56.	2.	35.00	
77893 Z	2827.2	SWC	LATROBE GROUP	1.26	61.	0.	.00	
77892 P	2880.4	SWC	LATROBE GROUP	2.20	49.	4.	11.60	
77892 O	2904.5	SWC	LATROBE GROUP	9.43	281.	2.	113.25	
77892 N	3038.4	SWC	LATROBE GROUP	1.73	116.	10.	11.94	
77892 K	3104.4	SWC	LATROBE GROUP	3.07	188.	3.	59.10	
77892 I	3200.4	SWC	LATROBE GROUP	3.72	209.	2.	115.57	
77892 H	3246.7	SWC	LATROBE GROUP	.98	52.	24.	2.15	
77893 W	3357.5	SWC	LATROBE GROUP	2.82	165.	2.	83.00	
77893 V	3382.2	SWC	LATROBE GROUP	1.87	121.	0.	.00	

PI=PRODUCTIVITY INDEX PC=PYROLYZABLE CARBON TC=TOTAL CARBON HI=HYDROGEN INDEX OI=OXYGEN INDEX

TABLE 3b (cont)

ROCK EVAL ANALYSES

BASIN - GIPPSLAND
WELL - ANGELFISH 1

REPORT B - TOTAL CARBON,H/O INDICES

SAMPLE NO.	DEPTH	SAMPLE TYPE	FORMATION	TC	HI	OI	HI/OI	COMMENTS
77893 U	3403.0	SWC	LATROBE GROUP	1.31	117.	0.	.00	

PI=PRODUCTIVITY INDEX PC=PYROLYZABLE CARBON TC=TOTAL CARBON HI=HYDROGEN INDEX OI=OXYGEN INDEX

TABLE 4a

ESSO AUSTRALIA LTD.

KEROGEN ELEMENTAL ANALYSIS REPORT

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	SAMPLE TYPE	--- ELEMENTAL % (ASH FREE) ---						COMMENTS
			N%	C%	H%	S%	O%	ASH%	
77893 R	1649.00	CRSW	1.23	49.89	3.84	.00	45.05	6.23	
77893 Q	1665.50	CRSW	1.99	64.98	5.26	.00	27.77	8.13	
77893 P	1717.40	CRSW	1.90	65.96	5.33	.00	26.81	7.93	
77894 O	1752.20	CRSW	1.62	63.34	4.63	.00	30.42	6.60	
77893 O	1785.00	CRSW	1.84	67.37	4.93	.00	25.85	5.08	
77894 N	1820.00	CRSW	1.82	66.89	5.14	.00	26.15	7.76	
77893 M	1906.30	CRSW	1.58	64.30	4.99	.00	29.13	10.22	HIGH ASH
77893 L	1933.00	CRSW	1.50	65.35	5.14	.00	28.00	11.94	HIGH ASH
77893 K	1965.00	CRSW	1.54	64.68	4.97	.00	28.81	1.53	
77893 J	1988.70	CRSW	1.80	65.42	5.22	.00	27.55	10.76	HIGH ASH
77893 I	2014.00	CRSW	.73	36.86	2.83	.00	60.45	10.75	
77894 M	2033.30	CRSW	1.51	68.54	4.85	.00	25.10	7.72	
77893 H	2050.50	CRSW	.77	35.24	2.83	.00	71.03	11.44	
77893 F	2095.00	CRSW	1.11	62.31	5.14	.00	31.49	.70	
77894 K	2188.00	CRSW	1.16	73.77	5.01	.00	20.05	3.84	
77894 J	2259.00	CRSW	1.50	72.57	5.14	.00	20.80	3.80	
77893 C	2280.00	CRSW	1.11	73.36	4.62	.00	20.91	3.54	
77894 I	2321.20	CRSW	1.08	74.95	5.67	.00	18.30	5.35	
77893 B	2379.20	CRSW	.99	71.63	4.53	.00	22.84	8.46	
77893 A	2415.70	CRSW	.89	67.31	4.75	.00	27.06	6.46	
77894 H	2453.00	CRSW	.94	72.36	4.96	.00	21.74	9.34	
77894 G	2505.00	CRSW	1.38	74.11	4.68	.00	19.84	7.69	
77894 F	2509.80	CRSW	1.11	62.51	3.51	.00	32.87	8.42	
77892 Y	2536.00	CRSW	.57	32.88	1.98	.00	64.58	2.97	
77892 W	2548.00	CRSW	.61	51.86	3.07	.00	44.46	10.30	HIGH ASH
77894 E	2575.20	CRSW	1.45	76.89	4.28	.00	17.39	4.81	
77892 V	2586.00	CRSW	1.07	75.57	4.07	.00	19.29	5.56	
77892 U	2611.50	CRSW	1.23	78.01	4.09	.00	16.67	3.71	
77894 D	2631.00	CRSW	1.45	79.60	3.96	.00	14.99	4.86	
77892 T	2651.00	CRSW	1.09	78.45	3.84	.00	16.63	7.98	
77894 C	2662.60	CRSW	1.28	79.32	4.56	.00	14.84	2.04	
77892 S	2680.30	CRSW	.52	27.61	2.20	.00	69.67	1.89	
77894 B	2706.50	CRSW	1.04	80.21	4.13	.00	14.61	2.26	
77892 R	2738.00	CRSW	1.14	80.45	4.53	.00	13.88	2.44	
77894 A	2767.10	CRSW	.97	76.17	4.19	.00	18.66	3.56	
77892 Q	2782.40	CRSW	.60	30.82	2.19	.00	66.39	1.18	
77893 Z	2827.20	CRSW	.94	79.68	4.48	.00	14.90	4.45	
77892 P	2880.40	CRSW	1.72	78.96	4.97	.00	14.35	4.17	
77892 O	2904.50	CRSW	1.20	70.40	5.04	.00	23.36	2.25	
77892 N	3038.40	CRSW	1.26	66.15	4.88	.00	27.71	8.93	
77892 K	3104.40	CRSW	1.57	74.87	5.54	.00	18.02	2.20	
77892 I	3200.40	CRSW	1.34	72.09	5.51	.00	21.07	4.12	
77892 H	3246.70	CRSW	1.70	83.17	5.20	.00	9.93	2.41	
77892 G	3258.00	CRSW	1.62	79.61	5.79	.00	12.98	1.17	
77892 F	3276.00	CRSW	1.54	80.90	5.61	.00	11.95	5.35	

TABLE 4a (cont)

ESSO AUSTRALIA LTD.

KEROGEN ELEMENTAL ANALYSIS REPORT

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	SAMPLE TYPE	--- ELEMENTAL % (ASH FREE) ---						COMMENTS
			N%	C%	H%	S%	O%	ASH%	
77892 C	3324.50	CRSW	1.70	80.31	5.19	.00	12.80	4.55	
77893 W	3357.50	CRSW	1.79	81.92	5.66	.00	10.62	3.02	
77893 V	3382.20	CRSW	1.76	82.39	5.45	.00	10.41	9.28	
77893 U	3403.00	CRSW	1.99	80.68	5.78	.00	11.55	1.90	

TABLE 4b.

18/09/86

ESSO AUSTRALIA LTD.

KEROGEN ELEMENTAL ANALYSIS REPORT

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	SAMPLE TYPE	AGE	FORMATION	ATOMIC RATIOS H/C	ATOMIC RATIOS O/C	ATOMIC RATIOS N/C	COMMENTS
77893 R	1649.00	CRSW	EARLY EOCENE	FLOUNDER	.92	.68	.02	
77893 Q	1665.50	CRSW	EARLY EOCENE	FLOUNDER	.97	.32	.03	
77893 P	1717.40	CRSW	EARLY EOCENE	FLOUNDER	.97	.30	.02	
77894 O	1752.20	CRSW	EARLY EOCENE	FLOUNDER	.88	.36	.02	
77893 O	1785.00	CRSW	EARLY EOCENE	FLOUNDER	.88	.29	.02	
77894 N	1820.00	CRSW	EARLY EOCENE	FLOUNDER	.92	.29	.02	
77893 M	1906.30	CRSW	EARLY EOCENE	FLOUNDER	.93	.34	.02	HIGH ASH
77893 L	1933.00	CRSW	EARLY EOCENE	FLOUNDER	.94	.32	.02	HIGH ASH
77893 K	1965.00	CRSW	EARLY EOCENE	FLOUNDER	.92	.33	.02	
77893 J	1988.70	CRSW	EARLY EOCENE	FLOUNDER	.96	.32	.02	HIGH ASH
77893 I	2014.00	CRSW	PALEOCENE	LATROBE GROUP	.92	1.23	.02	
77894 M	2033.30	CRSW	PALEOCENE	LATROBE GROUP	.85	.27	.02	
77893 H	2050.50	CRSW	PALEOCENE	LATROBE GROUP	.97	1.51	.02	
77893 F	2095.00	CRSW	PALEOCENE	LATROBE GROUP	.99	.38	.02	
77894 K	2188.00	CRSW	PALEOCENE	LATROBE GROUP	.82	.20	.01	
77894 J	2259.00	CRSW	PALEOCENE	LATROBE GROUP	.85	.21	.02	
77893 C	2280.00	CRSW	PALEOCENE	LATROBE GROUP	.76	.21	.01	
77894 I	2321.20	CRSW	PALEOCENE	LATROBE GROUP	.91	.18	.01	
77893 B	2379.20	CRSW	PALEOCENE	LATROBE GROUP	.76	.24	.01	
77893 A	2415.70	CRSW	PALEOCENE	LATROBE GROUP	.85	.30	.01	
77894 H	2453.00	CRSW	PALEOCENE	LATROBE GROUP	.82	.23	.01	
77894 G	2505.00	CRSW	PALEOCENE	LATROBE GROUP	.76	.20	.02	
77894 F	2509.80	CRSW	PALEOCENE	LATROBE GROUP	.67	.39	.02	
77892 Y	2536.00	CRSW	LATE CRETACEOUS	LATROBE GROUP	.72	1.47	.01	
77892 W	2548.00	CRSW	LATE CRETACEOUS	LATROBE GROUP	.71	.64	.01	HIGH ASH
77894 E	2575.20	CRSW	LATE CRETACEOUS	LATROBE GROUP	.67	.17	.02	
77892 V	2586.00	CRSW	LATE CRETACEOUS	LATROBE GROUP	.65	.19	.01	
77892 U	2611.50	CRSW	LATE CRETACEOUS	LATROBE GROUP	.63	.16	.01	
77894 D	2631.00	CRSW	LATE CRETACEOUS	LATROBE GROUP	.60	.14	.02	
77892 T	2651.00	CRSW	LATE CRETACEOUS	LATROBE GROUP	.59	.16	.01	
77894 C	2662.60	CRSW	LATE CRETACEOUS	LATROBE GROUP	.69	.14	.01	
77892 S	2680.30	CRSW	LATE CRETACEOUS	LATROBE GROUP	.96	1.89	.02	
77894 B	2706.50	CRSW	LATE CRETACEOUS	LATROBE GROUP	.62	.14	.01	
77892 R	2738.00	CRSW	LATE CRETACEOUS	LATROBE GROUP	.68	.13	.01	
77894 A	2767.10	CRSW	LATE CRETACEOUS	LATROBE GROUP	.66	.18	.01	
77892 Q	2782.40	CRSW	LATE CRETACEOUS	LATROBE GROUP	.85	1.62	.02	
77893 Z	2827.20	CRSW	LATE CRETACEOUS	LATROBE GROUP	.67	.14	.01	
77892 P	2880.40	CRSW	LATE CRETACEOUS	LATROBE GROUP	.75	.14	.02	
77892 O	2904.50	CRSW	LATE CRETACEOUS	LATROBE GROUP	.86	.25	.01	
77892 N	3038.40	CRSW	LATE CRETACEOUS	LATROBE GROUP	.88	.31	.02	
77892 K	3104.40	CRSW	LATE CRETACEOUS	LATROBE GROUP	.89	.18	.02	
77892 I	3200.40	CRSW	LATE CRETACEOUS	LATROBE GROUP	.92	.22	.02	
77892 H	3246.70	CRSW	LATE CRETACEOUS	LATROBE GROUP	.75	.09	.02	
77892 G	3258.00	CRSW	LATE CRETACEOUS	LATROBE GROUP	.87	.12	.02	
77892 F	3276.00	CRSW	LATE CRETACEOUS	LATROBE GROUP	.83	.11	.02	

TABLE 4b (cont)

KEROGEN ELEMENTAL ANALYSIS REPORT

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	SAMPLE TYPE	AGE	FORMATION	ATOMIC RATIOS H/C	ATOMIC RATIOS O/C	ATOMIC RATIOS N/C	COMMENTS
77892 C	3324.50	CRSW	LATE CRETACEOUS	LATROBE GROUP	.77	.12	.02	
77893 W	3357.50	CRSW	LATE CRETACEOUS	LATROBE GROUP	.83	.10	.02	
77893 V	3382.20	CRSW	LATE CRETACEOUS	LATROBE GROUP	.79	.09	.02	
77893 U	3403.00	CRSW	LATE CRETACEOUS	LATROBE GROUP	.86	.11	.02	

TABLE 5.

ESSO AUSTRALIA LTD.

VITRINITE REFLECTANCE REPORT

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	AGE	FORMATION	AN	MAX. RO	FLUOR. COLOUR	NO.CNTS.	MACERAL TYPE
77893 Q	1665.50	EARLY EOCENE	FLOUNDER	5	.34	YEL-OR	26	V>E>I,DOM SPARSE
77893 F	2095.00	PALEOCENE	LATROBE GROUP	5	.58	YEL-BRN	28	E>V>>I,DOM MAJOR
77893 D	2232.40	PALEOCENE	LATROBE GROUP	5	.66	BR YEL-OR	26	V>I>E,DOM ABSENT
77892 V	2586.00	LATE CRETACEOUS	LATROBE GROUP	5	.63	YEL-BRN	28	I>V>E,DOM COMMON
77892 O	2904.50	LATE CRETACEOUS	LATROBE GROUP	5	.69	YEL-DULL OR	28	V>E>I,DOM ABUNDANT
77892 I	3200.40	LATE CRETACEOUS	LATROBE GROUP	5	.71	YEL-WEAK BRN	29	V>E>I,DOM ABUNDANT
77892 C	3324.50	LATE CRETACEOUS	LATROBE GROUP	5	.87	YEL-DUL OR	27	V>I>E,DOM COMMON

TABLE 6.

OIL - API GRAVITY, POUR POINT & SULPHUR %

BASIN - GIPPSLAND
WELL - ANGELFISH 1

SAMPLE NO.	DEPTH	AGE	FORMATION	API GRAVITY	POUR PT.(OF)	SULPHUR %	COMMENTS
77892 A	3127.00	LATE CRETACEOUS	LATROBE GROUP	49.03	.00	.00	RFT 2/26
77892 B	3142.00	LATE CRETACEOUS	LATROBE GROUP	50.54	.00	.00	RFT 3/27

APPENDIX I

Detailed Vitrinite Reflectance and Exinite Fluorescence - Report by A.C. Cook

2454L:6

ANGELFISH NO. 1

KK No.	Esso No.	Depth m	$\bar{R}_v$ max %	Range R_v max %	N	Description Including Exinite Fluorescence
x4407	77893 -Q	1165.5 SWC	0.34	0.27-0.41	26	Rare sporinite and liptodetrinite, yellow to orange, rare resinite, yellow, rare dinoflagellates, yellow. (Silty sandstone. Dom sparse, V>E>I. Vitrinite and exinite rare, inertinite very rare. Carbonate common, sparse small yellow fluorescing droplets of ?oil. Pyrite (partly framboidal) major.)
x4408	77893 -F	2095 SWC	0.58	0.50-0.69	28	Abundant resinite, yellow to orange, abundant sporinite, yellow to orange, abundant suberinite, dull orange to brown, abundant liptodetrinite, yellow to orange, rare cutinite, orange. (Siltstone>coal>shaly coal. Coal major, V>E. Clarite>vitrite. Shaly coal major, V>E. Clarite>vitrite. Dom major, E>V>>I. Exinite abundant to major, vitrinite abundant, inertinite rare. Green fluorescing oil droplets rare. Weak green fluorescing oil cut from cracks in coal. Pyrite common.)
x4409	77893 -D	2232.4 SWC	0.66	0.59-0.74	26	Abundant resinite, bright yellow to orange, abundant sporinite, bright yellow to yellow orange, abundant suberinite, dull orange to brown, rare cutinite, yellow orange to orange. (Coal. V>I>E. Duroclarite>vitrite>clarodurite. Dom absent. Strong green fluorescing oil cut from coal. Lower Eastern View A facies.)
x4410	77892 -V	2586.0 SWC	0.63	0.50-0.75	28	Sparse sporinite, yellow to orange, sparse cutinite, orange, rare bituminite, brown, rare liptodetrinite, yellow to orange. (Sandstone> siltstone>coal. Coal sparse, vitrite. Dom common, I>V>E. Inertinite common, vitrinite and exinite sparse. Pyrite abundant.)
x4411	77892 -O	2904.5 SWC	0.69	0.51-0.79	28	Common sporinite, yellow to orange, sparse liptodetrinite, yellow to orange, rare cutinite, yellow orange to dull orange, rare resinite, yellow. (Siltstone>sandy siltstone> shaly coal>coal. Coal and shaly coal abundant, V>>E. Vitrite>>clarite. Dom abundant, V>E>I. Vitrinite abundant, exinite common, inertinite sparse. Moderate green fluorescing oil cut from coal.)
x4412	77892 -I	3200.4 SWC	0.71	0.58-0.81	29	Abundant sporinite, yellow to orange, abundant liptodetrinite, yellow to orange, sparse cutinite, orange to dull orange, rare suberinite, dull orange to weak brown. (Siltstone>coal. Coal abundant, V>>E. Vitrite>clarite. Dom abundant, V>E>I. Vitrinite and exinite abundant, inertinite sparse. Moderate, green fluorescing oil cut from coal. Pyrite abundant.)

ANGELFISH NO. 1

KK No.	Esso No.	Depth m	$\bar{R}_v$ max %	Range R_v max %	N	Description Including Exinite Fluorescence
x4413	77892 -C	3324.5 SWC	0.87	0.73-0.95	27	Rare cutinite, dull orange, rare sporinite, yellow to orange. (Calcareous siltstone>sandstone>coal>shaly coal. Coal abundant, V>>E. Vitrite. Shaly coal rare, V. Vitrite. Dom common, V>I>E. Vitrinite common, inertinite and exinite sparse. Pyrite common.)

APPENDIX 6

APPENDIX 6

APPENDIX 6

CORE ANALYSIS REPORT

The Australian
Mineral Development
Laboratories

Flemington Street, Frewville,
South Australia 5063
Phone Adelaide (08) 79 1662
Telex AA82520

Please address all
correspondence to
P.O. Box 114 Eastwood
SA 5063
In reply quote:

amdel

25 June 1986

F 3/178/0
F 5209/86

Esso Australia Limited
GPO Box 4047
SYDNEY NSW 2001

Attention: Mr A.P. Whittle
Mr A.N. Boston

REPORT F 5209/86

YOUR REFERENCE: 61:ANB/js/SUP

MATERIAL: Core sample plugs

IDENTIFICATION: Angelfish-1, cores 1 and 2

DATE RECEIVED: 4 April 1986

WORK REQUIRED: Routine core analysis

Investigation and Report by: Jim Thorpe

Manager-Petroleum Services Section: Dr Brian G. Steveson

for Dr William G. Spencer
General Manager
Applied Sciences Group

cc. Esso Australia Limited
GPO Box 4047
SYDNEY NSW 2001

Attention: Steve Benedek

cap

Head Office:
Flemington Street, Frewville
South Australia 5063
Telephone (08) 79 1662
Telex: Amdel AA82520
Pilot Plant:
Osman Place
Thebarton, S.A.
Telephone (08) 43 5733
Telex: Amdel AA82725
Branch Laboratories:
Melbourne, Vic.
Telephone (03) 645 3093
Perth, W.A.
Telephone (09) 325 7311
Telex: Amdel AA94893
Sydney, N.S.W.
Telephone (02) 439 7735
Telex: Amdel AA20053
Townsville
Queensland 4814
Telephone (077) 75 1377

1. INTRODUCTION

Nineteen core plugs from Angelfish-1, Cores 1 and 2 were received on 14 March 1986.

Testwork required was porosity and permeability at nett overburden pressure together with density determination.

2. PROCEDURES

The plugs were firstly cleaned in a Sonhelet extractor using a 3:1 chloroform methanol solvent mixture.

After drying to remove solvent the plugs were equilibrated in a humidity cabinet at 50°C and 50% relative humidity.

Following cooling in a sealed vessel porosity was measured by the Bayles Law helium injection technique, while each plug was confined at nett overburden pressure (37,900 kPa for Core 1 and 40,300 kPa for Core 2). While still confined the permeability to air was also measured.

Apparent grain densities were calculated in conjunction with porosity measurement. The plug offcuts were crushed to grain size using a mortar and pestle and grain density determined by pycnometry.

3. RESULTS

Results for Core 1 are given in Tables 1 and 2, and for Core 2 in Tables 3 and 4.

Table 1

AMDEL CORE ANALYSIS

Angelfish 1 Core 1 37900 kPa

Sample	Depth	Permeability (md)	Porosity (%)
15	3137.05	1.78	13.1
18	3137.33	2.02	13.8
20	3137.62	7.25	15.6
22	3137.81	4.05	15.1
24	3138.07	0.311	10.7
26	3138.32	6.19	15.4
28	3138.56	7.13	15.1
30	3338.81	7.35	14.7
32	3139.05	8.14	15.4
34	3139.29	7.9	17.0
35	3139.49	5.04	15.5
37	3139.74	0.716	12.2
39	3140.11	66	17.2
41	3140.35	18.9	16.3
42	3140.46	4.3	15.3

Table 2

AMDEL CORE ANALYSIS

Angelfish 1 Core 1 37900 kPa

Sample	Bulk Volume	Bulk Dry Density	Apparent Gn Density	Absolute Grain Den
15	20.65	2.34	2.70	2.69
18	20.91	2.31	2.68	2.68
20	20.34	2.27	2.69	2.68
22	20.68	2.28	2.69	2.66
24	20.79	2.42	2.70	2.67
26	20.85	2.28	2.69	2.68
28	20.68	2.27	2.68	2.67
30	19.95	2.28	2.67	2.67
32	20.85	2.26	2.67	2.67
34	20.67	2.24	2.70	2.66
35	21.14	2.27	2.68	2.67
37	20.89	2.36	2.68	2.67
39	20.72	2.21	2.67	2.66
41	20.69	2.23	2.67	2.67
42	20.81	2.26	2.67	2.66

Table 3

AMDEL CORE ANALYSIS

Angelfish 1 Core 2 40300 kPa

Sample	Depth	Permeability (md)	Porosity (%)
5	3335.17	7.88	13.5
8	3335.37	0.841	12.7
9	3335.45	0.099	10.3
12	3335.90	0.127	9.2

Table 4

AMDEL CORE ANALYSIS

Angelfish 1 Core 2 40300 kPa

Sample	Bulk Volume	Bulk Dry Density	Apparent Gn Density	Absolute Grain Den
5	20.29	2.32	2.69	2.67
8	20.55	2.39	2.73	2.69
9	21.03	2.44	2.73	2.71
12	20.89	2.47	2.72	2.71

ENCLOSURES

PE902362

This is an enclosure indicator page.
The enclosure PE902362 is enclosed within the container PE902361 at this location in this document.

The enclosure PE902362 has the following characteristics:

ITEM_BARCODE = PE902362
CONTAINER_BARCODE = PE902361
NAME = Geological Cross Section
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = CROSS_SECTION
DESCRIPTION = Geological Cross Section
REMARKS =
DATE_CREATED = 28/02/1987
DATE_RECEIVED = 27/03/1987
W_NO = W923
WELL_NAME = Angelfish-1
CONTRACTOR = ESSO
CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE902363

This is an enclosure indicator page.
The enclosure PE902363 is enclosed within the container PE902361 at this location in this document.

The enclosure PE902363 has the following characteristics:

ITEM_BARCODE = PE902363
CONTAINER_BARCODE = PE902361
NAME = Structure Map Mid Paleocene Marker
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = MAP
DESCRIPTION = Structure Map Mid Paleocene Marker
REMARKS =
DATE_CREATED = 31/12/1986
DATE_RECEIVED = 27/03/1987
W_NO = W923
WELL_NAME = Angelfish-1
CONTRACTOR = ESSO
CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE902364

This is an enclosure indicator page.
The enclosure PE902364 is enclosed within the container PE902361 at this location in this document.

The enclosure PE902364 has the following characteristics:

ITEM_BARCODE =	PE902364
CONTAINER_BARCODE =	PE902361
NAME =	Structure Map T.lilliei Seismic Marker
BASIN =	GIPPSLAND
PERMIT =	
TYPE =	WELL
SUBTYPE =	MAP
DESCRIPTION =	Structure Map T.lilliei Seismic Marker
REMARKS =	
DATE_CREATED =	31/12/1986
DATE_RECEIVED =	27/03/1987
W_NO =	W923
WELL_NAME =	Angelfish-1
CONTRACTOR =	ESSO
CLIENT_OP_CO =	ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE601124

This is an enclosure indicator page.
The enclosure PE601124 is enclosed within the container PE902361 at this location in this document.

The enclosure PE601124 has the following characteristics:

ITEM_BARCODE =	PE601124
CONTAINER_BARCODE =	PE902361
NAME =	Well Completion Log
BASIN =	GIPPSLAND
PERMIT =	
TYPE =	WELL
SUBTYPE =	WELL_LOG
DESCRIPTION =	Well Completion Log
REMARKS =	
DATE_CREATED =	18/12/1985
DATE_RECEIVED =	27/03/1987
W_NO =	W923
WELL_NAME =	Angelfish-1
CONTRACTOR =	ESSO
CLIENT_OP_CO =	ESSO

(Inserted by DNRE - Vic Govt Mines Dept)